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Seventeenth Annual Conference

on

Educational Measurements

Held at Indiana University
April 18 and 19, 1930

Bureau of Coöperative Research, Indiana University School of Education

HENRY LESTER SMITH, Director

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Program of Conference on Educational Measurements

April 18 and 19, 1930

First Session, Friday, 10:00 a.m.

Miss Mattie B. Frye, Supervisor of Instruction, Anderson, and President of the Indiana State Teachers' Association, presiding.

10:00. A Comparison of the Accomplishment of Two Groups of Pupils in the Bloomington, Indiana, High School in Second-Semester Algebra. J. Z. A. McCaughan, High School Critic Teacher, Indiana University.

10:30. Developing Standards for and Measuring Results of Administrative Activities in High School. W. W. Patty, Professor of Education, Indiana University.

11:15. Types of Diagnostic Studies in Arithmetic. G. T. Buswell, Professor of Education, University of Chicago.

Second Session, Friday, 2:00 p.m.

C. V. Haworth, Superintendent of Schools, Kokomo, presiding.

2:00. The Growth of Concepts of Technical Terms in Arithmetic. G. T. Buswell, Professor of Education, University of Chicago.

3:15. Some Investigations Resulting from the Testing Program in Arithmetic. Clifford Woody, Director of Bureau of Educational Reference and Research, University of Michigan.

Dinner Session, Friday, 6:00 p.m.

Grover T. Somers, Associate Professor of Education, Indiana University, presiding.

7:00. Address. Roy P. Wisehart, State Superintendent of Public Instruction.

Fourth Session, Friday, 8:00 p.m.

H. L. Smith, Dean of School of Education, Indiana University, presiding.

8:00. Impressions of the German School System. Clifford Woody, Director of Bureau of Educational Reference and Research, University of Michigan.

Fifth Session, Saturday, 9:30 a.m.

Merle J. Abbett, Superintendent of Schools, Bedford, and President of City and Town Superintendents' Association, presiding.

9:30. Enrollment by Subjects in North Central Association High Schools in Indiana the First Semester, 1929-30. Carl G. F. Franzén, Professor of Secondary Education, Indiana University.

10:00. Are Our Secondary Schools Improving? H. H. Remmers, Associate Professor of Education and Psychology, Purdue University.

10:45. Mental and Educational Achievements of Students Entering Institutions of Higher Learning in September, 1929. Clifford Woody, Director of Bureau of Educational Reference and Research, University of Michigan.

A Comparison of the Accomplishment of Two Groups of Pupils in the Bloomington, Indiana, High School in Second-Semester Algebra

J. Z. A. McCaughan, High School Critic Teacher, Indiana University

The two groups of pupils in this experiment were matched solely on the basis of the Indiana University Mental Scale, Schedule D, administered by Miss Mildred Pleasant, a graduate student working under Dr. Herman H. Young. This test was given to all second-semester algebra pupils then present in school and the matches were made from those whose programs could be adjusted to the conditions of the experiment. The class instruction group had four pupils and the individual instruction group had six pupils whose programs could not be adjusted with the matchings of the mental test grades. These pupils were divided into two groups of twenty-three pupils each. The instruction in one group was such as is general in the high schools of Indiana, viz., class instruction. In the other group individual instruction was given.

The instruction of the two groups was carried on almost entirely by supervised teachers, there being two teachers for each of the pupil groups. The critic teacher cared for the giving (not grading) of written tests in the individual instruction group. It was impossible to predict with certainty the qualities or the equality of these four practice teachers. At the end of their course in supervised teaching, one of the teachers of the class instruction group was graded C+ and the other B+. In the individual instruction class one teacher was graded B+ and the other A. There was no encouragement to rivalry between teachers or pupils of the two groups and no comparison of grades during the progress of the experiment.

These two groups were assembled for this experiment at the close of the first six weeks of the second semester. Their grades for the first six weeks, therefore, were already made out. About 60 per cent of the pupils in each section had some change of program to be made in order to adjust their programs for the experiment.

The subject-matter on which the comparison was based is that set forth in Nyberg's *First Course in Algebra*, Chapters VIII to XII inclusive. A syllabus for each of these chapters was made out by the critic for pupils' guidance and a copy was given to each pupil in both sections. These syllabi were used by the teachers as a guide for instruction in both sections.

The tests were based on the subject-matter outlined in the syllabi. They were so planned and administered that the question lists and all scratch paper were handed in. Duplicate or triplicate forms of equal

difficulty (in the critic's judgment) were used, so that pupils who took any test early could not reliably report the test questions to others. All pupils in the class instruction group took the same test on the same day, except that any absentee taking the test later was given a different form from that taken by his classmates. The test questions were all weighted and rules for marking were uniform. The critic has every reason to believe that the grading was conscientiously done.

Pupils in the individual instruction group were expected to work as fast as they pleased but not as slowly as they pleased. They were required to be present and to study during each recitation period, to report on a special form their progress for the day, and to write down also any questions they might have on what they had studied. The report of progress was necessary because of the conviction that parents are also interested parties in an experiment of this kind. The written questions were required in order to give point to the pupils' troubles and thereby to help them to study. The teachers, also, could quickly determine from the questions the distribution and amount of instruction necessary during the recitation period.

As a rule, neither of the teachers of this group was able to keep up with answering the pupils' questions. But the partner teacher and the critic (one, or at times both) were always watching to help at the overcrowded times. It was rare for a pupil to be delayed very long on account of needing help. Pupils who completed the work outlined early were given the final examination and excused from further presence in the recitation period.

Miscellaneous observations and conclusions arrived at thru this study follow:

1. The groups were evenly matched in preparation and ability. The median percentile rank on the Indiana University Mental Test, Schedule D, was 80 with a range of 41 to 97 for the class instruction group, and 81 with a range of 41 to 94 for the individual instruction group. The median score on the final examination for the first semester of each group was 78, with a range of 51 to 101 for the class instruction group and 37 to 116 for the individual instruction group. The median score on the final examination for the second semester was 66 for the class instruction group, with a range of 15 to 92, and 53 for the individual instruction group, with a range of 12 to 91. On a special test in multiplication given to the two groups, the class instruction group made a median score of 100 and the individual instruction group made one of 98.

Scores made by the two groups on tests given on chapters studied in Nyberg's *First Course in Algebra* are shown in Table I.

2. The median age of the class instruction group was 14 years, 5 months, with a range of from 13 years, 4 months, to 16 years, 4 months; while the median age of the individual instruction group was 14 years, 6 months, with a range of from 13 years, 3 months, to 17 years, 1 month. The ages of the pupils and the scores made by them on various tests show that the two groups represent well the ordinary teaching conditions in most high school classes.

TABLE I—RESULTS OBTAINED ON TESTS ON TEXT

Chapter in Nyberg's Algebra	Median Score Class Instruction Group	Median Score Individual Instruction Group
VIII	70	75
IX	79	79
X	90	88
XI and XII	66	49

At the end of the semester five pupils failed in each group.

3. According to Table I the individual instruction group was superior at first, but the class instruction group gradually gained on them and was superior to them during the latter part of the semester.

4. The individual instruction group had a slight advantage in quality of teachers and a decided advantage in amount of personal instruction.

5. It may be said that the work in neither section was in fair shape for testing when the semester closed. The slower pupils in the individual instruction group showed the full effect of their slowness in this test. The class instruction group had the advantage here of having been carried over the subject-matter together in class work whether they had given personal attention to the work or not in outside-of-class-time study.

6. In the individual instruction group four pupils finished their work before the close of the semester. These gained vacations of 15, 15, 13, and 12 days respectively. It is needless to say that all four of these pupils approved the individual method. However, these pupils made somewhat lower grades on tests during this experiment than they had consistently made in the previous part of the school year under class instruction.

7. The brighter pupils asked more questions than the slower pupils. Teachers would be glad if the slower pupils would study well enough to be able to ask questions.

8. Some pupils were averse to using the syllabus. It was in ordinary handwriting, mimeographed, and they preferred the textbook as a guide for study.

9. The supervised teachers in the individual instruction group could not resist the idea that they were wasting time repeating certain phases of their instruction to individual pupils. Of course they had no way of matching this with the possible waste of time in instructing pupils over subject-matter which they already understood in teaching by the class method.

10. Each of the supervised teachers felt that pupils would have sustained considerable loss of study time in waiting to have their questions answered if it had not been for the help of the critic and the other supervised teacher "in the pinches."

11. The two supervised teachers differed somewhat in their opinion on the fitness of the pupils for self-direction in study. They agreed,

however, that (1) this fitness was already characteristic of the stronger pupils, (2) some pupils made plain progress in this line, and (3) others made little or no progress.

12. Both teachers and the critic agreed that this method was too much like the laboratory method for its work to be properly done in 40-minute daily recitation periods. It would help to have the recitation room available for conference with pupils during the period before as well as the period after the regular recitation.

From a study of this experiment and from reports of other experiments of the same nature, the critic believes that the following statements are true:

1. Modern class teaching gives enough attention to individuals (slow, ordinary, or fast) to do all with them that is likely to be done by following a purely individual method.

2. The class method, including teaching how to study, teaching the whole class, teaching a group out of the class, individual teaching individuals in a special conference, and meeting maximum and minimum requirements of subject-matter, is as effective and far more economical than the individual method.

3. The figures in Table I do not show much difference between the accomplishments in the two groups of pupils compared. It is highly probable that, under the guidance of any conscientious teacher, any two classes taught by two more or less different methods over the same subject-matter would show practically the same outcomes.

4. The critic is aware that the time covered in this experiment is small, as are also the numbers of pupils involved and the amount of subject-matter covered. The conclusions drawn, therefore, should be considered valid only in so far as they agree with those of other investigations carried on over a wider field, with greater numbers of pupils, and for a longer period of time.

A plan for repeating a simple experiment in individualized instruction in second-semester algebra follows:

1. Near the end of the first grading period of the 9B algebra work, administer some good mental test, such as the Indiana University Mental Scale, Schedule D.

2. During the following two weeks these test papers should be graded so that all teachers who instruct second-semester classes may use their information as a guide in giving instruction.

3. As soon as the grades of all grade periods but the last one of the semester are made out, two matched sections should be listed. The matching should be based on the findings of the mental test and the periodic grades already recorded.

4. The matched lists should be submitted to the high school principal so that he may form the two sections and put their recitations at convenient times on the program for second semester.

5. The periods chosen should be those least subject to interruption from extra-curricular activities, etc.

6. Each school should work out its own scheme for equalizing instruction. Previous experience in both individualized instruction and

class instruction is a desirable qualification for any teacher who would undertake to instruct both groups. If the teaching is to be done by a critic and four supervised teachers (as in the experiment now under discussion), the supervised teachers might be rotated in a scheme somewhat like the following:

Teachers are represented by numerals 1, 2, 3, 4.

Period	Class Instruction Group	Individual Instruction Group
1	1, 2	3, 4
2	4, 1	2, 3
3	3, 4	1, 2
4	2, 3	4, 1

7. Syllabi should be perfected, especially in the line of specific skills to be acquired. Possibly a better adaptation of syllabi to the Nyberg text and to the Tentative State Outline Course of Study for Indiana High Schools might be made.

8. A means of making public the progress of all the members of both classes might be devised. I am not sure, however, that such an incentive should be brought into an experiment.

Developing Standards for and Measuring Results of Administrative Activities in High School

W. W. PATTY, Professor of Education, Indiana University

Have Secondary School Principals Been Judged Fairly?

Is the efficiency of the secondary school principal being judged fairly? It seems to be a justifiable assumption that most educators would make a negative reply. Too frequently trustees, school boards, survey staffs, and the patrons of the school base their estimates of success or failure of the principal upon the apparent success or failure (judged by their own individual prejudices) of one or a few activities for which they hold the principal responsible.

Many high school principals in Indiana and other states will testify that consistently winning basketball teams contribute materially to their professional standings in their communities. Others bask in the reflected glory of a state Latin contest winner, of a champion high school band, or of an Edison contest winner. Still others are regarded favorably by trustees and certain groups of taxpayers because of having gained reputations for keeping operating expenses of the school at a minimum.

In What Respect Have Judgments of Administrators Been Unsound?

Usually the activities that have influenced these opinions are such as receive publicity naturally. Judgments based solely upon such criteria are manifestly unsound. First, such activities are by no means adequate indices of successful administration. Successful management of the less spectacular activities of the high school often contribute more to its real success. Secondly, winning is often due to such accidents as the possession of superior athletic material, the enrollment of a pupil with a rich endowment of mentality, or a home environment favorable to developing ambition and special talents. Moreover, the principal who courts popularity with the taxpayers or school officials who are of the kind who are interested chiefly in keeping school expenditures at low figures may be winning such approval by false economy that robs children of that high school district of favorable educational opportunities to which they are entitled.

Conversely an efficient high school principal, administering the physical education program for the welfare of all boys and girls in his school, may be held responsible for losses of athletic teams that are really due to inferior physical material. Altho he manages a well-balanced, varied curricular program, there may be no pupil in school in

whom are combined the factors of superior mental capacity, good health, special interest and ambition, and favorable home environment necessary to winning unusual scholastic honors.

How Should the Worth of a High School Principal Be Estimated?

A secondary school principal should be judged not by one incident alone, such as wise or unwise handling of a disciplinary case, or initiating some popular movement, but by the skill and wisdom of his methods of administering all of the activities for which he is responsible.

Our best physicians and surgeons lose patients occasionally thru no fault of their own. If the most skilful surgeon is forced to operate upon a patient who has a weak heart, the patient may not live thru the operation in spite of the superior wisdom and skill of the surgeon. Also, patients of great physical vitality may rally after an operation by a surgeon of low quality in spite of ignorant treatment. Surgeons are judged by their peers before being allowed to practice. They gain their reputations later chiefly because of demonstrated knowledge and skill in following best standards of procedure set up by the medical profession.

In a like manner standards of procedure in administering the high school should be set up by educators specializing in that field of work. The high school principal's professional reputation should depend upon his demonstrated knowledge and skill in following the best standards of procedure in his profession.

Why Have High School Administrators Been Unfairly Judged?

If the work of the secondary school administrator has been judged unfairly, what are the causes? Perhaps the chief reason is because definite standards for and objective methods of measurement of administrative activities of the high school principal have not existed heretofore.

Since the educational profession has been slow in developing definite criteria for evaluating the work of the high school principal, is it strange that people have felt free to pass individual judgment—each according to his own interests and standards?

The mental attitude of the public toward professional services in the past has seemed to be that whenever a definite body of professional knowledge and standards has been developed, the value of these services has been recognized. The administration of these technical services has then been left to trained experts. Likewise, the lay public has been inclined to leave the evaluation of such professional services to trained experts. Thus we find boards of specialists examining to test the candidate's right to practice medicine or law in the various states. Thus a lawyer accused of malpractice is tried by the bar of his state, rather than by popular opinion or a jury. In the Education field the most striking example is the degree to which the measurement of school buildings by educational experts, using the Strayer and Engelhardt building standards and score cards, has displaced popular opinion as a method of deciding upon the advisability of a school building program.

What Are the Needs for Measuring Devices for High School Administrative Activities?

Obviously the most important need for impartial measuring devices to use in estimating the value of the school principal's services is to remove undue pressure to seek personal popularity and to put a premium upon impartial and efficient administration. The high school administrator's job is to manage the school so as to realize the greatest values possible to its pupils. These values should be measured as outcomes of the curricular and extra-curricular programs. For what does it profit the state to demand that its high school principals familiarize themselves with the objectives and cardinal principles of secondary education, require them to study special courses in its teacher-training institutions to gain a whole world of administrative technics calculated to enable him to manage a high school in the best manner now known, and then, when he secures a position, permit him to be subjected to the caprice of a single trustee, the avarice of the selfish taxpayer, and the whim of the gambler on athletic contests so that he loses his professional soul?

A second need for a measuring device, then, seems to be that high school inspection divisions of our state departments may have an instrument for measuring the efficiency of the high school administrator when classifying high schools. Such measurement should be added to the measurement of the school building, the quality of teaching, the adequacy of library and laboratory facilities, and the training of teachers.

A third need for such a measuring device is that the efficiency of administration of secondary schools should be measured as part of school surveys. Those conducting school surveys have thus far neglected administrative activities of secondary school principals and assistant executives. The reason that such activities have not been evaluated is apparently that measuring instruments have not been available.

A fourth need is emphasized by the rapidly increasing amount of attention required for the administration of the extra-curricular activities of the modern secondary school. Without a convenient measuring device available, the secondary school administrator has been handicapped in judging which activities should be accepted and which rejected as parts of the local school program.

Certain extra-curricular activities are often given places in a local school program simply because they are in the programs of other schools. Sometimes they are adopted without regard to local suitability. Some of the factors that should help to determine suitability are: first, educational values; second, interests of pupils; third, climate; fourth, housing facilities, such as availability of an auditorium or stage, science laboratories, and gymnasium; fifth, availability and cost of equipment, such as band or orchestra instruments (not individual), radio sending and receiving sets, football equipment, etc.; and sixth, size of school. Apparently it is more desirable to foster one each of six different types of extra-curricular activities than six activities of the same type.

What Precedents of Similar Nature Have Already Been Established?

There have been established three important precedents of similar character that have influenced the development of ideas concerning the possibilities of establishing standards of procedure and a score card for measurement of high school administrative activities. These are: the army officers' rating plan used during the war, rating scales for teachers, and standards and score cards for measuring school buildings.

While the army officers' rating plan and teachers' rating scales were quite different from the proposed standards and score cards for evaluating high school administrative activities, they at least recognized that gross guesses as to the worth of an individual are inferior to numerical totals of estimates of specific qualities. Strayer, Engelhardt, and Hart made an outstanding contribution to educational administration by developing standards and score cards for measuring the adequacy of school buildings and the suitability of records for school systems.

What Is the Method of Procedure Being Used in Developing Standards and Score Cards for High School Administrative Activities?

The major steps followed in this study are as follows:

1. Making a detailed analysis of the activity.
2. Grouping of sub-activities.
3. Setting up of ideal standards of procedure for each sub-activity.
4. Distributing 10,000 points among the various divisions or groups of sub-activities.
5. Distributing each division quota to its sub-activities, listing under four types of outcomes of the four major objectives of secondary education.
6. Revising of the fourth step of work after considering the fifth.
7. Selecting the jury of experts for the coöperative development of the standards and score card.
8. Submitting tentative forms of standards and score card to experts for their reactions.
9. Revising tentative standards and score card in the light of expert opinions.

The first six steps were carried out with the aid of two groups of graduate students and later revised into the form of the tentative standards and score card. The next step was to secure the assistance of a group of experts to assist in refining the standards and reweighting the more than one hundred sub-activities of the score card.

In this case an unusually well qualified group of experts was available, since the names of the sponsors of high school newspapers in the various states whose papers won first honors in ranking in the United States last year were published in a recent magazine. A return post card soliciting coöperation was mailed to these individuals with the gratifying result that twenty agreed to coöperate in the project. A copy of the post-card content follows:

> We are attempting to develop definite and desirable standards for conducting the publication of the high school newspaper. We

have set up tentative standards and have developed a score card for the evaluation of such an activity. Knowing that you have had successful experience in supervising the publication of a high school newspaper, we wish to ascertain whether you would be willing to coöperate with us in their standardization. Please use the return post card to indicate whether or not you can find time to read a copy of these standards and this score card and give us the benefit of your judgment.

W. W. Patty,
Professor of Education,
Indiana University.

W. W. Patty,
School of Education,
Indiana University.

I shall be willing to coöperate with you in standardizing the score card for the high school newspaper by reading the same and suggesting revision of standards and weighting of items on the score card.

Signed: .....
High School: .....
City: .....
State: .....

These sponsors were located in twelve states as follows: Illinois, one; Indiana, two; Iowa, one; Kansas, two; Massachusetts, one; Michigan, one; Minnesota, three; Missouri, one; Nebraska, one; Ohio, four; Texas, two; and Washington, one.

Copies of standards were mimeographed in such a way that a triple choice of response[1] was presented after each standard. Reference to a sample page from the standards will indicate the possibility of the sponsor expressing entire agreement with the standard as stated, entire disagreement, or partial disagreement, with suggestions for rephrasing.

Copies of score cards with tentative weightings were also mimeographed so that a space left vacant below each weighting provided opportunity for each sponsor to give the same or different weightings to each item. Reference to the following sample sheet of the tentative score card will make clear the method used.

A copy of the following letter of instructions accompanied each set of standards and score card. These were mailed together with a stamped and addressed envelope for the return of the material.

January 31, 1930.

My dear Mr. .....:

A few weeks ago you very kindly agreed to coöperate with the study that I am directing in our Bureau of Coöperative Research in the School of Education, Indiana University, in developing standards of procedure and methods of measurement of the publication of the high school newspaper. You may be interested to know that 69 of the sponsors of high school newspapers who won "first honors" rating last year have agreed to assist in this standardization project.

I am mailing to you under separate cover a copy of the tentative standards and score card for your consideration. I have purposely delayed sending these to you until after the Christmas holidays and the rush of mid-year examinations, with the hope that the present would be the most favorable time for you to give your attention to this coöperative project.

[1] This triple response method is similar to that originated by Dean H. L. Smith in his investigation regarding the formulation of desirable theses for education for world peace.

(Sample Sheet From *Tentative* Standards)

"Administering The Publication of The High School Newspaper"

I. Taking care of exchange—
Every school which publishes a newspaper should exchange with other schools. The exchange column should not contain comments on the exchange papers but should contain only choice news of other schools that would likely be of interest to the local student body. Exercise of judgment as to the value of news from other schools becomes a valuable activity.

Do you agree with this standard as stated?
Yes..... No.....
Do you disapprove absolutely of the above standard?
Yes..... No.....
If you agree with standard in part, but not in its entirety, kindly write revision on the back of this standard.

J. Attending and reporting social activities—
Reporters should not depend on getting their information second-hand but should on all occasions possible attend the events themselves and make sure to get every item correct. The writing should be done in an interesting manner which demands thoro knowledge of the construction of a good news story. How to write up a social event is an activity well worth while and one that many will find occasion to use in later life.

Do you agree with this standard as stated?
Yes..... No.....
Do you disapprove absolutely of the above standard?
Yes..... No.....
If you agree with standard in part, but not in its entirety, kindly write revision on the back of this standard.

K. Attending and reporting athletic events—
This type of news story is different from all others in that there is a special vocabulary used effectively in sport news. The writer needs to be able to use this vocabulary in an effective manner. He must have well in mind the fundamentals of good sportsmanship and apply them in his writing; he must not fail to give opponents credit where it is due and refrain from writing up personalities. He should not place undue emphasis on individual performance, but rather make team and school loyalty the key note.

Do you agree with this standard as stated?
Yes..... No.....
Do you disapprove absolutely of the above standard?
Yes..... No.....
If you agree with standard in part, but not in its entirety, kindly write revision on the back of this standard.

L. Attending and reporting literary events—
In reporting literary events the reporter should be careful to give the news in a correct and interesting manner. Whether it be a class play, an oratorical contest, a club program, or any other form of literary activity, the reporter should attend it in order to obtain the details correctly.

(Sample Sheet of *Tentative* Score Card)
"Administering the Publication of the High School Newspaper"

	HEALTH									LEISURE									SOCIAL									VOCATION									TOTALS		
	Fruitful Knowledge	Ideals and Attitudes	Mental Technique	Habits and Skills	Sub-Item	Item	Sub-Division	Division		Fruitful Knowledge	Ideals and Attitudes	Mental Technique	Habits and Skills	Sub-Item	Item	Sub-Division	Division		Fruitful Knowledge	Ideals and Attitudes	Mental Technique	Habits and Skills	Sub-Item	Item	Sub Division	Division		Fruitful Knowledge	Ideals and Attitudes	Mental Technique	Habits and Skills	Sub-Item	Item	Sub-Division	Division		Total Sub-Items	Total Items	Total Sub-Divisions	Total Divisions	Grand Total
F. Arranging to Get Special News																			10	10	20	5						35	10	30	30							150		
G. Writing Items										5	5								20	10	35	5						50	25	25	20							200		
H. Writing Feature Stories										15	30	10	5						10	25	5	5						40	50	45	30							300		
I. Taking Care of Exchange										10	5	10	5						20	10	5	15						30	15	5	20							150		
J. Attending and Reporting Social Activities	10	5	5	5						30	15	10	20						35	25	20	10						5	20	25	10							250		
K. Attending and Reporting Athletic Events	15	30	5	10						25	15	10	20						5	10		5						20	15	5	10							200		
L. Attending and Reporting Literary Events	5	5								25	15	10	20						13	12	15	10						15	25	15	5							200		
M. Attending and Reporting Public Events	5	10								15	20	10	5						50	35	20	10						15	25	20	10							250		

Explanations of What Is Desired

The Standards:

I think you will understand what is desired by way of coöperation concerning the standards quite readily. After each tentative standard there are three questions. If you agree with the standards as stated, you simply check in the space after the word "yes," etc. The probabilities are that in some cases you will not agree exactly nor disagree entirely with the standard. I wish to call your attention to the third statement following each standard. If you agree only in part with the tentative standard, will you kindly draw an arrow to the margin and place on the back of the sheet a restatement of the standard as you would approve it.

The Score Card:

In case you have not given any special attention to a score card similar to the one that I am submitting, the tentative score card may be somewhat less clear at first glance.

These are the essential points of the score card: Each major item on the score card corresponds in order to the major items on the standards; likewise, the minor items on the standards have their relative places on the score card.

We have taken 10,000 points as the perfect total for the activity of publishing a high school newspaper. After we analyzed the activity of publication, we divided the list of activities into the major sections as indicated on both the standard and the score card. We then distributed the 10,000 points as seemed to us best between the major divisions of the activity. For example, the third major division is: "Student Staff Organization and Control" which we felt was worth, all together, 750 points out of the total 10,000. You will note that these 750 points are again subdivided as follows: Selection of Staff, 190 points; Forming Policy, 70 points; Guiding Policy, 90 points; Making Assignments, 70 points; Assigning "beats," 80 points; Enforcing News Deadline, 120 points; Checking News from Reporter, 70 points; Checking Stories to Printer, 60 points. Then the points assigned to each of these subdivisions are distributed under the four phases of the four major objectives of secondary education. For example: the 70 points assigned to Forming Policy are distributed as follows: to fruitful knowledge contributing to the social objective, 10 points; to ideals and attitudes, 10 points; and to mental technic, 10 points.

A part of the technic of the present study is original with us, but the general idea of using the four major objectives of secondary education with the four types of outcomes under each that we hope for in our educational activities is in conformity with the recent studies of extra-curricular activities from the analysis point of view by the North Central Assocation of accredited schools and colleges.

What we would like for you to do with the score card is this: You will notice that after each item, such as III B, Forming Policy, that our tentative evaluations are placed above the broken line. We would like for you to place your estimate of the revised distribution of points below the broken line in the same section. Please feel absolutely free to redistribute the ten thousand points thruout the score card according to your own best judgment.

May I assure you that we appreciate very much your willingness to coöperate with us in this project which we hope may be of educational value.

We shall be especially grateful if you can find it possible to give this your attention during the week following the receipt of this material as it will enable us to start consolidating the results and revising the material accordingly. If it is not possible to do this during the first week, please send us your results at your first opportunity as we shall plan to wait three weeks before we begin computing results, unless we have received answers from all coöperating before that time.

Cordially yours,

Signed: W. W. Patty
Willard W. Patty,
Professor of Education.

What Kinds of Suggestions Were Made?

There was a markedly favorable attitude shown by the sponsors toward the tentative standards as a whole. The ratio of favorable to unfavorable responses to the various standards naturally varied greatly. Sponsors were unanimously in favor of thirty-two standards as stated. The following example illustrates the kind of standard given unanimous approval:

III. F. Enforcing news "deadline"—
Promptness in completing a task is one of the important things to be learned in connection with newspaper work. It is important, then, that there be established a "deadline" after which time news will not be accepted, and that this "deadline" be rigidly enforced.

There was no standard receiving unanimous disapproval. The lowest per cent of approval was 60 per cent accorded to four standards. A copy of a standard least favored follows:

VIII. B. Planning campaign—
The students should be organized into a regular subscription campaign before the first issue comes out. A speaker should go to each room making a talk for the paper; and a number should visit the homes and business places to get subscriptions. Each solicitor should be supplied with a receipt book, collections should be made, and the entire sales campaign put over in the shortest possible time. It would be the best policy to divide the town into sections with certain students canvassing each section in order to avoid calling on the same person more than once.

A few samples of typical suggestions of sponsors regarding improvement of standards follow:

II. C. Duties of the Sponsor—(tentative standard)
The sponsor should supervise the production in all of its phases: Namely, composition, make-up, financing, and distribution. He should select the members of the student staff consisting of editor-in-chief, business manager, and assistant printing shop manager and should confer with these three in the selection of their respective assistants. Selection and promotion should in every case be based upon the relative efficiency and capability of the students concerned. The sponsor should have the authority to remove any student from the staff for any justifiable reason.

Suggestions for Improvement of Standard (Duties of Sponsor)—

1. The Sponsor should be relieved of sufficient classroom teaching, study hall, or other administrative assignment to partly compensate for the long periods of after school work that must be done in the publication work. The Sponsor should not hold his position under exactly the same circumstances as other teachers. He should have more privileges, he should be relieved of such routine as having a home room that involves keeping attendance of pupils, and the like. Because of the infinite details connected with publishing a paper he is heavily burdened and should not have as heavy a teaching program as other teachers, also. He should not have to teach any other subject than journalism in its various phases—no English, history, language, "to fill in" his program so that he will have just as many classes a day and just as many pupils.

2. The Sponsor should not have the mechanical details saddled on him; let that be taken care of by the printing instructor or head of the printing shop. If the school has its own print-shop as your standard provides, the composition and other mechanical operations belong there. The editorial and advertising departments are enough for the sponsor to supervise.

3. If the editorial and business sponsorship are separate there should be definitely understood coöperation. It is better to divide financial and editorial responsibility and let both teachers teach other regular English classes. Self-centered specialization is a bad thing on the paper, in dramatics, in debate, etc. The teacher should have the last word in the choice of students for all positions.

4. It is better for the Sponsor to assign the stories because staff members are not always wise in judging the capabilities of students.

IV. V. Writing editorials—(tentative standard)

Editorials should be written to conform to the general policies worked out by the staff. They should be on subjects common in the lives of the students if they are to have the proper influence on the actions of the students. They should reflect the attitudes of the school as a whole and should be well written. Constant interviews with the principal and the teachers should be the rule in expressing views and suggesting improvements, so that the policy of the school is carried out properly. It is in this department of the paper that the greatest good as well as the greatest harm can be done. For this reason great care should be taken by the editorial writers to keep in harmony with the underlying principles of good conduct.

Suggestions for Improvement of Standard (Editorials)—

Every school newspaper ought to carry at least one editorial challenging to the intelligence—not merely promote school spirit. Editorials should avoid too much preaching. It is good for students to write editorials trying to interpret news of the country, etc., as "Disarmament Conference," "Crash of the Stock Market." This develops better readers of newspapers.

IV. H. Writing feature stories—(tentative standard)

The most difficult type of story for the high school writer is the feature story. It should be effective in manner and should have just the right amount of human interest without overdoing the emotional elements. Only the better writers should attempt feature stories, and only the best stories should be selected for publication.

Suggestions for Improvement of Standard (Feature Stories)—

In feature stories, never let the victim read the story if it can be helped; at least never call his attention to the story.

IV. K. Attending and reporting athletic events—(tentative standard)
This type of news story is different from all others in that there is a special vocabulary used effectively in sport news. The writer needs to be able to use this vocabulary in an effective manner. He must have well in mind the fundamentals of good sportsmanship and apply them in his writing; he must not fail to give opponents credit where it is due and refrain from writing up personalities. He should not place undue emphasis upon individual performance, but rather make team and school loyalty the key note.

Suggestions for Improvement of Standard (Athletic Reporting)—
In case of a paper published every two weeks, the event often has to be written up before it takes place, otherwise it is stale. In this case effort should be put on advance story. In reporting athletic events the special vocabulary is badly overdone. Most sport writers (apprentice hands) have nothing else. The best sport writers evolve a fresh vocabulary. It ill behooves us to recommend jargon. Sport writers on the best city newspapers know they must play up individuals. Readers will not read accounts of a good team. They want names.

In revising the standard due consideration is given to all suggestions. In reweighting the items on the score card the mean will be adopted as final. While it is realized that the method of developing standards and score card just described has not eliminated subjective judgments, it is believed that the concensus of judgments of experts in the field given to the detailed analysis and weightings imparts a high level of validity and reliability to the measuring device thus developed.

Can Such a Device Be Developed in All Fields of High School Administration?

It seems that similar procedures may be successful in developing measuring devices for other administrative activities of the high school principal. A sample page of a preliminary form of Standards for Administering the High School Schedule, now being developed, is here given as an illustration.

(Sample Sheet From *Tentative* Standards)

TENTATIVE STANDARDS FOR THE ADMINISTRATION OF THE HIGH SCHOOL SCHEDULE

I. PRELIMINARY SURVEY

A. Sending literature to parents and students.
1. Time of sending.
Not later than five weeks before the end of the first semester and not later than three weeks before the end of the second semester, the principal should begin a survey preliminary to the securing of data necessary to the construction of an adequate schedule. This literature should be sent to the parents by the pupils.

2. Nature of the information.
The information to be sent to all parents of both old and prospective students should consist of the following:
(*a*) A list of all subjects to be offered, arranged under the various curriculum heads.

(*b*) Literature, brief but concise and attractive, on the nature of special courses, the cultural, vocational, and social values of the courses, and college entrance requirements.

(*c*) An appeal to the parents for their coöperation with the faculty and child to the end that each child may make the best possible selection.

B. Lectures.

The principal should appeal to the parents and old students (by old students we mean those already in High School) thru lectures in the Parent-Teacher Association and school assemblies, emphasizing the importance of wise selection. He should go or send an assistant to the various grade schools from which his high school draws its students.

C. Conferences with students.

In each of these schools he should have conferences with the eighth grade students, in which he can acquaint them with the nature of the high school work and distribute the literature mentioned under "A." He should invite all prospective students to the school on a special guest day before the end of the semester.

D. Data secured from old students.

A card which contains spaces for the name of the pupil, age, grade, and choice of courses should be given to each student. This card is now ready to be filled out with the aid of parental and faculty advice. The principal should make special effort to encourage consultation with teachers and deans, by posting a schedule of conference hours. These cards should be filled out and filed in the office three weeks before the end of the first semester.

E. Data secured from new students.

Conclusion

In developing the standards for various administrative activities for which the high school principal is responsible, an attempt is being made to set up an ideal. It is realized that few, if any, administrators could realize the ideal completely. The standards being developed are best suited to large high schools.

Modifications are being suggested for medium-sized and small high schools. In using the score card and standards for measuring the efficiency of a principal, a perfect score would not be expected. It is hoped to determine standard norms for administrators of high schools of various sizes later.

The score cards may be used as follows:

1. As self-measuring devices for high school principals.
2. As measuring devices of secondary school principals by school superintendents.
3. As measuring devices of secondary school administration by inspectors of the state and the North Central Association of Schools and Colleges.
4. As measuring devices for secondary school administration activities in school survey.

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Two major uses for the standards are apparent:

1. To make individual subjective judgments of the quality of administrative activities of the secondary school more nearly objective.
2. To present a tentative ideal of procedure for administering each activity to secondary school administrators.

Work is going forward with the development of standards and score cards for approximately forty extra-curricular activities and six other activities of high school administration. The project of revising the standards and score card for publication of the high school newspaper is nearing completion and should be available soon to those interested. Other tentative standards and score cards will be revised from time to time. It is hoped to establish norms for use in measuring these activities at some future time.

It is realized that the procedures used in developing the present project are open to much justifiable adverse criticism. Such criticism will be welcomed. Also, constructive suggestions are invited. It is hoped that the entire project may make a contribution of some slight value to the development of better standards for administering and more nearly objective methods for measuring high school administrative activities.

Types of Diagnostic Studies in Arithmetic

(Abstract)

G. T. BUSWELL, Professor of Education, University of Chicago

IN the early development of the testing movement the principal use of standardized tests was to make a survey of the achievements of pupils in different school systems. The tests which were used for this purpose, commonly designated as survey tests, were standardized in such a manner that a particular school system could compare the achievement of its pupils with that of pupils from any other school system. These tests were used primarily for administrative purposes and very frequently had little or no effect upon the teaching done in the classroom. During the latter part of the testing movement diagnostic tests have been developed, the purpose of which has been to enable the teacher and supervisor to determine the particular needs of pupils and to modify teaching accordingly. In the beginning these diagnostic tests were very much like the survey tests and were ordinarily administered to groups of pupils. Later on, however, individual diagnostic tests were constructed which were to be used in making a more complete analysis of the types of errors and the causes of errors of individual pupils.

These diagnostic tests differ from the survey tests in two particular respects. First, instead of having a numerical score for a norm they have a list of habits of work or categories of errors which constitute the norm. The person who uses the diagnostic tests has a list of the expected errors or the expected habits of work against which the particular performances of any individual child may be checked. The second way in which the diagnostic tests differ from the survey tests is that they have no time limits, there being no particular need of limiting the time for the child since the aim of the tests is to find out as much as possible about how the child does his work. The particular thesis of this discussion is that improvement in arithmetic can be secured by first making a detailed diagnosis of the habits of work and the mental processes of an individual pupil, following which the efforts of the teacher should be directed toward correcting the erroneous mental processes and thereby removing the errors which characterize the pupil's work.

In carrying on this type of diagnostic work it is important that the diagnosis be based upon the actual observation of the child as he works rather than upon the answers which a child may give on a test paper. Very frequently one will make a completely erroneous inference as to the cause of a mistake on a pupil's paper. For example, the following case may be cited:

"In the example, 86 minus 4, a third-grade pupil secured as his answer 81 instead of 82. If this example had occurred in a test and the teacher were trying to discover the cause of the error from the answer on the paper, he would doubtless infer that the cause of the mistake was lack of knowledge of the combination, six minus four. What the boy actually did was as follows: 'Six and four are ten. Ten and eight are 18. Turn it the other way makes 81.' He then wrote 81 as his answer. Obviously, the case is much more serious than it would have been if he had simply made a mistake in the combination, for he showed by his work that he was entirely unfamiliar with the principles of subtraction. More drill on subtraction will not help this pupil until he has had definite instruction in regard to the processes involved."

The chief purpose of individual diagnosis is to discover how the child works when he proceeds in his ordinary manner. Consequently, the best method of making such a diagnosis is to sit down with the child, ask him to work orally, and then observe all that he does while getting the answers to a set of arithmetic examples. The teacher should not be concerned in this process with whether the child is accurate or not since the purpose the teacher has is to discover just how the pupil proceeds. Correcting of mistakes should not be done during the process of diagnosis. The child should be encouraged to think out loud and to give every indication possible as to what he is doing as he works his examples. The teacher should make notes regarding the child's method, and as far as possible these notes should be a verbatim reproduction of what the child says. Following the period of actual diagnosis the teacher may classify the various habits of work revealed in her notes and should then write a prescription as to the kind of teaching which the child needs for the process which has been diagnosed. If the teacher uses any one of the several diagnostic tests which list the habits of work or the causes of errors for the various processes, she will find it very convenient simply to check on the list of habits the particular ones each child exhibits. The method of teaching following this should be specific individual instruction in which the child's attention should be centered upon the desirable ways of working his examples rather than upon erroneous ways which he may have exhibited in the diagnosis.

The habits of work which the teacher may expect to discover can be illustrated in the following list of the ten most common habits observed in a large number of diagnoses of the process of addition.

1. Making errors in combinations.
2. Counting.
3. Adding the carried number last.
4. Forgetting to add the carried number.
5. Retracing work after partly done.
6. Adding carried number irregularly.
7. Writing the number to be carried.
8. Carrying the wrong number.
9. Irregular procedure in column addition.
10. Grouping two or more numbers.

In similar fashion the ten most common habits for division were found to be the following:

1. Making errors in combination.
2. Errors in subtraction.
3. Errors in multiplication.
4. Using remainder larger than divisor.
5. Finding quotient by trial multiplication.
6. Neglecting to use remainder within the example.
7. Omitting zeros resulting from another digit.
8. Using wrong operation.
9. Omitting digit in dividend.
10. Counting to get the quotient.

While a teacher may think that the individual diagnosis necessary to secure such specific information in regard to a pupil's work will require more time and energy than can be given to it, experience with a considerable group of teachers has indicated that the total amount of time required for this kind of teaching over a semester is no greater than the total amount of time required in ordinary classroom recitation. It does require somewhat longer to make the initial diagnoses, but the saving of time which results from specific teaching of what is needed rather than on general teaching covering much that is not needed soon compensates for the larger amount of time spent in the beginning. Furthermore, the increased effectiveness of specific teaching is so pronounced that the value of finding out exactly what the needs of the pupil are thru some form of adequate diagnosis may be revealed to any teacher who will give this technique a serious trial.

Real teaching must be based upon an analysis of the work of the pupil. The trend toward specific analysis of pupil difficulties has now become so pronounced that the older type of mass teaching is hardly justified in a subject where such specific types of errors may be located as is the case in arithmetic.

The Growth of Concepts of Technical Terms in Arithmetic

(Abstract)

G. T. BUSWELL, Professor of Education, University of Chicago

THE development of vocabulary lists for spelling and reading has reached the point where a large body of specific knowledge is available as to what are the common and important words to present to children. Beginning with the Ayres' spelling list, vocabulary studies in spelling have been accumulated until now the Commonwealth list, prepared by Professor Horn, is a most useful instrument for curriculum makers. Likewise, in the field of reading the Thorndike word list and the Gates list of words for the primary grades have become so widely used that one can scarcely examine a new primary reader without finding reference made to one or the other of these vocabularies. In the field of arithmetic less has been done, altho the Pressey vocabulary lists for mathematics are well known. However, it is becoming quite generally recognized that the teaching of technical terms in arithmetic cannot be accomplished by depending upon textbooks in reading to present these terms. Unless teachers of arithmetic assume the responsibility for developing a technical vocabulary in this subject the child will experience a good many difficulties due solely to lack of knowledge of words needed in arithmetic.

In this discussion three types of considerations will be given to the problem of technical vocabularies in arithmetic. In the first place, reference will be made to an analysis of a series of arithmetic textbooks, which indicates that the number of words in such texts is very large and that the vocabulary is quite different from that of textbooks in reading of corresponding grades. In the second place, some data will be presented showing how children develop the concepts of technical terms as they proceed from grade to grade. Third, the practice of authors of textbooks of arithmetic will be examined to find to what extent they use care in presenting new technical terms and in explaining them so the child will understand.

Several good studies have been made in which textbooks in arithmetic have been analyzed from the standpoint of their vocabulary. One of the best of these is an unpublished Master's thesis by Miss Ava Hunt. Miss Hunt analyzed the vocabularies of six third-grade textbooks in arithmetic and ten third-grade textbooks in reading. Some of her findings may be summarized as follows: The total vocabulary of the six textbooks in arithmetic was found to be 2,993 different words while the average vocabulary consisted in 1,262 different words. The common vocabulary of these arithmetics contained only 350 different words or 11.7 per cent of the total vocabulary. Of the total vocabulary in arithmetic, 44.9 per cent appeared in only one textbook. Most of

these words appeared less than four times in the one book in which they were used. The statistically technical vocabulary of the six arithmetic textbooks contained 306 words or 10.2 per cent of the total. Only 34 of these 306 words were used in all the textbooks. Of the arithmetic vocabulary, 514 words, or 17.2 per cent, were found in the common vocabulary of the ten third-grade readers. Of the vocabulary in the arithmetic textbooks, 32.7 per cent did not occur in any of the ten readers. Of the 306 technical words in arithmetic, only 12 occur in all ten readers.

From this brief summary of the facts presented in Miss Hunt's investigation it becomes clear that the problem of teaching technical terms in arithmetic must be assumed directly by the teacher of arithmetic and that the reading class will not be sufficient for the development of the necessary familiarity with arithmetical terms. Teaching technical vocabularies must be thought of as an integral part of the instruction in the arithmetic class.

Complete familiarity with a word does not come suddenly. Concepts of words are built up gradually and as a rule a considerable period of time elapses between the first contact with the word and what may be considered sufficient familiarity with it. Concepts of the technical terms in arithmetic are the product of a long period of development. In some cases these concepts begin as early as the pre-school period while in other cases they are not learned until the particular technical term is needed. One of the most interesting aspects of this development of vocabulary is the series of changes in concepts of words as children pass thru the grades of the elementary school. In order to study these changes 240 children were selected from the six grades of the elementary school and were presented with a list of 25 words with the request that they give the meaning of the terms as they are used in arithmetic. Forty children were chosen from each of the elementary grades and they were also classified in terms of mental ability, all levels being represented. The investigator and the child sat down together and the pupil gave the meanings of the words presented. Some of the words were very simple, such as, count, both, each, and enough, while others were more strictly technical terms such as, quotient, multiplier, and divisor. Other terms used were partly technical, but were words which the child would probably hear outside of school as well as in the arithmetic class. Among these were such words as discount, worth, average, and acre. After the 240 children had been tested, the answers were classified and were grouped according to whether they were satisfactory, wrong, or doubtful. In the following table the responses given to the word "discount" are shown. It is particularly interesting in this table to note the great variety of meanings which children attach to this word and also to note that even children in the early grades are beginning to build up some definite concept of it. Tables such as this were prepared for each word in the list. They showed not only the gradual development of knowledge of technical terms, but they also displayed a very large amount of this information concerning the meaning of these words. Such a study emphasizes again the importance of specific attention to the development of technical terms in the arithmetic class.

TABLE I—MEANINGS GIVEN FOR WORD NUMBER 12, *DISCOUNT*

Number	Type	Meaning	School Grade						Total
			I	II	III	IV	V	VI	
1	S	Buy something cheaper. At a sale. Or wholesale	0	0	2	1	6	12	21
2	S	Give 10% discount. Take 10% off the cost	0	0	0	1	4	9	14
3	S	Take money off the bill	0	0	0	0	5	2	7
4	S	To sell for less than you pay for it	0	0	0	0	1	0	1
5	S	To get back some money; not as much as ordinary price	0	0	0	0	0	1	1
6	S	Something like a discount would be 50%. Pay less	0	0	0	0	0	1	1
7	D	A bank discount	0	1	0	2	2	3	8
8	D	Get something and get a discount	0	0	0	1	1	2	4
9	D	Discount some money	0	2	2	0	0	0	4
10	W	Hear it when mother comes from town, but don't know what it means	0	0	1	0	0	0	1
11	D	Get a discount at a store	0	0	0	2	0	0	2
12	W	(To subtract.) Put down in arithmetic and discount it. 8 −5 3 is discount	0	0	1	0	1	1	3
13	W	Not counting right	1	1	3	6	1	0	12
14	W	(This) "dis" count. I have kept "dis" count of my money	1	0	0	0	0	0	1
15	W	When you discount you don't count	0	2	0	3	0	0	5
16	W	Count backwards	0	1	0	0	0	0	1
17	W	To know how to count	0	1	0	1	0	0	2
18	W	Count it (money) over again	0	0	1	1	0	0	2
19	W	Have a charge account at a store	0	0	1	2	0	0	3
20	W	He discounted you. If you gave him right money he would not give you your money back	0	0	1	0	0	0	1
21	W	To pay more	0	0	0	0	1	1	2
22	W	To have money in the bank	0	0	0	4	2	0	6
23	W	Buy something and pay part. The rest is the discount	0	0	0	0	1	0	1
24	W	What the storekeeper makes on everything he sells	0	0	0	0	1	0	1
25	W	What you have to give back when you borrow	0	0	0	0	1	0	1
26	W	To take money out of the bank	0	0	0	0	1	0	1
27	W	Means you can't have any more; don't want to give any more	0	0	0	0	1	0	1
28	W	What you get for money in the bank	0	0	0	0	1	0	1
29	W	Per cent	0	0	0	0	0	1	1
30	W	Return things purchased and get money back	0	0	0	0	0	3	3
31	W	When you get some money	0	0	0	0	0	1	1
32	W	To put somebody out	0	0	0	1	0	0	1
33	O	Omitted	38	32	28	15	10	3	126
Summary		Satisfactory	0	0	2	2	16	25	45
		Doubtful	0	3	2	5	3	5	18
		Wrong	2	5	8	18	11	7	51
		Omitted	38	32	28	15	10	3	126
Total number of cases			40	40	40	40	40	40	240

The need for the teaching of technical vocabulary in arithmetic has been revealed by reference both to the analysis of textbooks and to the testing of children's own concepts. It is of interest to see how authors of textbooks present new technical terms. Accordingly ten textbooks were examined to find out how words were first introduced. To illustrate, the word "average" may be used. Tabulation was made of the way this word was first explained and also the number of times it was used in the first ten pages following its initial use. For the ten books examined the word "average" was used in its first explanation ten times by one author and once by another. This initial use, plus the additional occurrence of the word in the next ten pages, occasioned twenty-seven presentations by the first author and five presentations by the second. In examining the explanations a considerable degree of variation was found, some authors simply using the word in a problem and giving directions for solving the problem, whereas others introduced it by the use of concrete illustrations. When the practices of the various textbooks are compared it is quite apparent that the authors have in many cases introduced new terms without giving the matter any particular thought, and in all probability they have not been aware of the number of times the word has been used in its first presentation or in repetition during the next few pages. Until authors of textbooks in arithmetic take the same pains with vocabulary as is the case in the preparation of textbooks in reading, children will continue to be bothered by the use of words which they understand very imperfectly.

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Some Investigations Resulting from the Testing Program in Arithmetic

CLIFFORD WOODY, Director of Bureau of Educational Reference and Research, University of Michigan

Introduction

THE dominant purpose underlying the launching of a general testing program or a testing program in a particular subject, at the present stage of development of the testing movement, is the improvement of instruction. In a certain sense the purpose of the testing program may be said to be appraisal thru comparison of the ascertained levels of achievement with expected levels of achievement, but the main purpose is not usually in the comparisons *per se*. The main interest lies in diagnosis of the strengths and weaknesses of the particular school unit concerned and in suggestions obtained for improving the situation portrayed. Too often the suggestions for improvement confine themselves to such administrative changes as have resulted in the regrouping of pupils into X, Y, and Z groups, according to the amount of mental ability shown; to the reclassification of the pupils of a given grade within the grade itself, without changing the general gradation of the pupils; or to the assignment of pupils to ungraded classes, or to commercial, industrial, or vocational courses. These administrative changes are often advantageous and result in much good. However, it should be said that administration, as such, is merely a device for facilitating the education of the children, and that administrative changes are not justified unless they result in a greater amount of improvement than would otherwise be obtained or in the same amount of improvement obtained with greater ease. Administrative changes may result in both of these advantages, but as a general rule these changes have little influence on the real processes of instruction. Grouping of the pupils according to ability may be helpful, but the fact remains that the mere grouping of pupils does not tell how to instruct them so as to bring about improvement of instruction. Pedagogical changes in the methods of instruction, and not merely administrative changes, must be largely responsible for improvement of instruction.

If the testing program is launched primarily for the purpose of the improvement of instruction, just how may the results be utilized in order to bring about this improvement? This program of using the test results to bring about the improvement of instruction consists of at least five steps: (1) the making of adequate tabulations so that the central tendencies of the results may be apparent; (2) the collection of supplementary data concerning time allotments, methods of teaching, promotion rates, ages of pupils, mental ability of the pupils, etc., to aid in the interpretation of the tabulated results; (3) the holding of adequate

conferences with individual teachers or with groups of teachers concerning the results of the tests, so that they may know what the testing is all about; (4) the formulation of definite programs of remedial instruction, so that there may be a definite attempt to remedy the situation portrayed; and (5) the stimulation of different teachers to set up controlled experiments for the purpose of evaluating suggested variation in the teaching procedure, or to study intensively special cases of either normal children or children having difficulty in the mastery of the particular subject under consideration so that the difficulties of mastering the subject may be ascertained. If those responsible for a testing program omit any of these steps in dealing with the test results, it is very likely that they are not using the tests and test results in the most effective manner.

It is impossible for the Bureau of Educational Reference and Research at the University of Michigan, because of its very nature, to deal in the suggested fashion with the results of the tests obtained from the testing programs which it directs; yet it does make an attempt to stimulate the different schools participating to deal with the results in the manner indicated. The Bureau from time to time suggests remedial programs of instruction and indicates variations in teaching procedure which may be studied under closely controlled conditions. At times the Bureau sets up the experimental controls and seeks the coöperation of different school systems in evaluating different types of teaching procedure; at other times the writer, who serves not only as Director of the Bureau but Professor of Education as well, directs different investigations in his seminar courses and reports the results to the cities coöperating in the testing programs. The Bureau, thru each of these types of activities, hopes to make the use of the results obtained from the testing programs a vital force in improvement of instruction.

The investigations to be presented in this paper, while stimulated thru consideration of the results obtained from testing programs, constitute the contributions of graduate students at the University of Michigan working under the sole or partial direction of the writer for advanced credit or degrees in Education. Of the three investigations to be presented, two may be termed coöperative research, in that they involve the coöperation of a number of school systems; the other is a case study in arithmetic, selected from those made within a single school system. Since the investigations are varied in nature, it is hoped that they will suggest, to those interested in measurement, the types of inquiry which should be stimulated in connection with participation in testing programs.

An Investigation to Determine the Influence of Specialized Drill in Reading upon the Solution of Verbal Problems

The first investigation to be reviewed represents an attempt to throw some light on the influence of drill in reading verbal problems on the ability to solve this type of problem.[1] It is frequently asserted that chil-

[1] Walter O. Shriner. *The Influence of Specific Drill Exercises in Reading on Various Factors in the Solution of Verbal Problems in Arithmetic.* (Unpublished doctor's dissertation, University of Michigan.)

dren cannot solve verbal problems in arithmetic simply because they cannot read the problems. But to what extent is this assertion true? Reading exercises have often been prescribed as remedial exercises for those pupils who are unable to solve verbal problems. But to what extent does the use of such exercises improve the situation portrayed? Osburne found that 60 per cent of all errors made in the solution of verbal problems are due to failure to comprehend the meaning of the problems, and suggested reading exercises for overcoming the difficulty, but he provided no evidence to show that his remedial suggestion is effective.[2] One or two investigations had been made which threw some light on the problem, but, while they were suggestive, they did not provide a satisfactory answer. Hence, there was need for an investigation to determine the value of reading as a remedial exercise for overcoming inability to solve verbal problems in arithmetic.

Statement of Problem. The problem, as stated in this investigation, was to determine the influence of specific drill exercises in reading on various factors involved in the solution of verbal problems in arithmetic. The drill exercises were specially constructed exercises with emphasis not only on the reading of arithmetic problems but on those aspects of reading which are essential to an understanding of the problem elements involved. In the determination of the aspects of reading to be stressed, the exercises were based upon two types of analyses: (1) desirable outcomes to be derived from the solution of verbal problems, and (2) types of errors made in the solution of verbal problems. On the basis of these analyses, effort was made to incorporate in the exercises the following types of reading activities: careful reading, analysis of what is read, analysis of what is required, estimation of answers, choice of procedure, interpretation of definitions and rules, organization and consistency, vocabulary, relationships, and verification.

Sample Drill Exercises. The following exercises are reproduced in order to make clear their nature.

Stressing Careful Reading

PROBLEM 1. We have 3 new words added to our spelling list each day. How many new words do we have in 5 days? . . . If you are asked to find the number of new words that we have on the fifth day, underline the word, YES, given below; if not, the word DAY:

FIVE DAY NO YES

Stressing Analysis of What Is Given

PROBLEM 1. Mr. Jones on successive days did the following: He opened a bank account with $2,763.27; took out $216.15; deposited $287.24; took out $741.00; took out $1,272.35; deposited $1,000.00. How much did he then have in the bank? . . . Underline the number, given below, which tells how many numbers you would add to find out the total amount of withdrawals:

3 4 5 6

[2] Worth J. Osburne, *Corrective Arithmetic* (Houghton Mifflin Company, 1924).

PROBLEM 2. If Grace lives 8 blocks from school and it takes 1¼ minutes to walk 1 block, when must she start from home in order to arrive at school at quarter before nine o'clock? . . . Underline the phrase, given below, that tells what was given:

(*a*) Grace wants to arrive at exactly nine o'clock
(*b*) Grace lives 1¾ blocks away from the school
(*c*) Grace can walk one block in exactly 1¼ minutes
(*d*) Grace can walk 8 blocks in 9 hours
(*e*) The time Grace must start from home

Stressing Analysis of What Is Required

PROBLEM 1. Mr. Brown allowed Howard and his sister Clara to plant a small piece of ground with vegetables and flowers. They paid $6.80 for fertilizer and $2.50 for seed. What was their outlay? . . . Underline the number, given below, that tells how many things you are asked to find in this problem:

1 2 3 4

PROBLEM 2. A boy had 120 marbles and lost one-fourth of them. How many had he left? . . . Underline the phrase, given below, that states what you are asked to find in the problem:

(*a*) How many marbles the boy lost
(*b*) How many marbles were not lost
(*c*) How many marbles the boy had at first
(*d*) Where the marbles were lost
(*e*) What part of the marbles were lost

Stressing Estimate of Answers

PROBLEM 1. A man left $5,000 to be divided equally among his five children. He had one boy and four girls. How much of the money was left to the girls? . . . Underline the answer, given below, that is the most reasonable:

1,000 2,000 3,000 4,000 5,000

PROBLEM 2. A city had a population of 8,750 some years ago, but its population is now 240 per cent of that number. What is the present population? . . . Underline the word, given below, that tells how the present population compares with that of some years ago:

EQUAL LESS MORE SAME

Stressing Choice of Procedure

PROBLEM 1. If you knew the sum of all the items in a bill, and also knew the amount of change that the customer received, how would you find the amount of money that was handed the clerk? . . . Underline the word, given below, that tells the right thing to do:

SUBTRACT MULTIPLY ADD DIVIDE

PROBLEM 2. A man owns four farms. One contains 126 acres, another 98 acres, another 67 acres, and the fourth 271 acres. How

many more acres were in the largest farm than in the smallest? . . . Underline the procedure, given below, that is the right one to follow:

(*a*) ADD 126, 98, 67, and 271
(*b*) SUBTRACT 98 from 126
(*c*) SUBTRACT 271 from 67
(*d*) SUBTRACT 67 from 271
(*e*) MULTIPLY 67 by 4
(*f*) DIVIDE 271 by 67

PROBLEM 3. A farmer has a large pail of milk. He knows that it contains 10 quarts of milk. How many pint bottles can he fill from this pail? . . . Fill in the blanks, given below, that tell the right thing to do. Here you do not fill in all the blanks:

ADD.....TO..... SUBTRACT.....FROM.....
DIVIDE.....BY..... MULTIPLY.....BY.....

Stressing Reading and Judgment

PROBLEM 1. Eight girls plan to buy an 80-cent basket of fruit for a schoolmate who is ill. How much must each give if they share the cost equally? . . . Underline the word FRUIT, given below, if the problem which follows means the same as the one above; if not, the word BASKET: "Eight girls plan to buy two 80-cent baskets of fruit for a schoolmate who is ill. How much money must each give if they share the cost equally?"

EQUAL BASKET CENTS FRUIT

Stressing Interpretation of Rules

PROBLEM 1. It is customary to express any sum, difference, product, or quotient in lowest terms. What is the customary way of expressing the sum of ¼ and ¼? . . . Underline the number, given below, that we should give as the sum:

1/4 2/4 1/2 2/8

PROBLEM 2. Annexing a zero to a decimal does not change the value. . . . Underline the numbers, given below, having the same value as .6:

60 .6000 .60 6.0

Stressing Organization and Consistency

PROBLEM 1. How many gallons of water will it take to fill seven 3½ gallon cans? . . . Fill in the blank following each question below with the proper answer:

(*a*) How many cans are to be filled?.....
(*b*) Will answer be in gallons, pounds, or cans?.....
(*c*) Are you to find time it takes to fill cans?.....
(*d*) How many numbers are given in the problem?.....
(*e*) Would you add, subtract, divide, or multiply?.....

Stressing Completion Reading

PROBLEM 1. On a field of 10 acres a farmer had successive cuttings of alfalfa during one season as follows: 12 tons, 8 tons, 7 tons, and 6

tons. What was the yield per acre for the season? . . . Write JUST ONE WORD on each blank line below that tells the story as given in the problem:

> The smallest yield per cutting was.....tons and was obtained from the.....cutting. There were nine.....of alfalfa. The farmer cut the alfalfa.....times during the..... To find the answer you would add.....numbers, then..... this sum by..... .

PROBLEM 2. Fractions whose numerators are less than the denominators are called.....fractions.

Practice booklets, containing enough exercises to permit ten-minute daily drill for eight weeks, were printed. In arranging the material for printing, two precautions were taken: (1) to introduce only a single type of reading activity in an exercise for a given day until there has been considerable drill on that type of activity; and (2) to print the exercises constituting the drill for one day on two facing pages of the booklet. The first precaution was taken merely to guarantee that the child would be given enough practice with one type of exercise to get thoroly familiar with it before being faced with another type of exercise or exercises in scramble form.

Method of Experimentation. Six different school systems coöperated in the investigation to determine the value of the prepared practice booklets. The investigation involved 1,191 pupils: 374 in Grade V, 434 in Grade VI, and 383 in Grade VII. At the beginning of the investigation these pupils were roughly divided into experimental and control groups. Effort was made in making these divisions so to differentiate the pupils that the general nature of the school population, the quality of teaching, and the general school conditions for the experimental and control groups would be approximately equal. The total time per day devoted to the teaching of arithmetic was the same in both groups. The teachers in the control group followed their usual teaching procedure. Those in the experimental group had the pupils use the practice booklets for the first ten minutes of the time usually devoted to the teaching of arithmetic each day and then used a few additional minutes in the correction of the exercises and in discussing with the pupils the correct answers and the necessity for careful reading. The amount of time for correction and discussion of answers varied from day to day but it was usually not more than five or ten minutes. This time for correction and discussion was incidental to the use of the remedial exercises and probably increased the value derived from their use. It consumed a part of the time usually devoted to teaching of the subject, but the only variable considered is the ten minutes devoted to the actual taking of the exercises. These practice books were used in the experimental group for a period of ten weeks.

Method of Evaluation. An effort to measure the effect of the use of the practice booklet was made on the hypothesis that such effect could be determined in terms of change in pupil response to various types of standardized tests. The following battery of tests was given at the beginning and end of the investigation: National Intelligence Scale, Buckingham Problem Scale, Stevenson Problem Analysis Test, Woody-McCall

Mixed Fundamentals in Arithmetic, an especially designed vocabulary test, and the Monroe Reading Test. The mental test was given for the purpose of aiding in the equating of the experimental and control groups. The Buckingham test was used for the purpose of measuring growth in ability to solve verbal problems; the Stevenson test, to measure an ability very closely related to the nature of the practice given; the Woody-McCall test, to ascertain the effect of the practice on the ability to solve abstract exercises involving the fundamental operations; the vocabulary test, to measure growth in knowledge of technical terms; and the Monroe Reading Test to determine the effect of practice exercises on a general measure of reading ability.

At the close of the ten weeks, during which the investigation was in progress, matched groups of pupils were selected from the total number participating in the investigation. In forming these groups the following factors were kept constant or as nearly constant as possible: sex, chronological age, mental age, and initial score on the Buckingham Problem Scale. The maximum difference allowed in chronological age and in mental age was 6 months; the maximum difference allowed on the Buckingham scale for Grades V and VI was 4 points; for Grade VII, 2 points. By this process of matching the pupils in the two groups, the general form of the distribution, the central tendencies, and the deviations were approximately equal.

Results. Table I exhibits a final summary showing the effects of the use of the specialized drill material in reading. From this tabulation the following points are significant:

1. The matching of the pupils on the basis of sex, chronological age, mental age, and initial score on the Buckingham Problem Scale, reduced the number of pupils under consideration from approximately 400 per grade to approximately 65 per grade.

2. The experimental group made greater gains on the Buckingham Problem Scale in all three grades. The gain of the experimental over the control group varies from .46 in Grade VI to 1.19 in Grade V. The ratios of the probable errors to the excess gain would signify that these gains are not especially significant. However, it should be pointed out that the probable error is a function of the number of cases, and since the number of cases under consideration is small, the probable error is relatively large. For this reason the excess gains in the experimental groups may be more significant than the ratios indicate.

3. The experimental groups made more significant gains than the control groups on the Stevenson Problem Analysis Test. The fact that the ratios of the probable error of gains to the excess gains are 4 or 5 times the probable error indicates a real superiority of the experimental group on this test, even tho the number of cases is limited. This result may well have been expected since the practice exercises correspond very closely to the type of ability measured by the Stevenson Problem Analysis Test.

4. The gains on the Woody-McCall test, for the experimental and control groups, are not consistent. In Grade V the results show significant excess gains for the control groups; in Grade VII, significant excess

TABLE I—GAINS AND PROBABLE ERRORS OF GAINS ON THE VARIOUS TESTS RESULTING FROM THE USE OF THE SPECIALIZED DRILLS IN THE EXPERIMENTAL AND CONTROL GROUPS

Grade	Group	Number of Cases	Gain	P. E. Gain	Excess Gain	P. E. Excess Gain	Significance of Excess Gain
		BUCKINGHAM PROBLEM SCALE					
Grade V:	Experimental..	62	6.16	.467	1.19	.715	1.7
	Control.....	62	4.97	.541	.....		
Grade VI:	Experimental..	65	5.72	.420	.46	.535—	.9
	Control.....	65	5.26	.331	.....		
Grade VII:	Experimental..	63	2.61	.359	.91	.559	1.6
	Control.....	63	1.70	.429	.....		
		STEVENSON PROBLEM ANALYSIS TEST					
Grade V:	Experimental..	62	6.57	.343	2.83	.496—	5.7
	Control.....	62	3.74	.358	.....		
Grade VI:	Experimental..	65	6.00	.328	2.15	.424+	5.1
	Control.....	65	3.83	.269	.....		
Grade VII:	Experimental..	63	3.49	.309	1.87	.437	4.3
	Control.....	63	1.62	.309	.....		
		WOODY-McCALL MIXED FUNDAMENTALS TEST					
Grade V:	Experimental..	62	.66	.253	.....		
	Control.....	62	2.33	.284	1.67	.380	4.4
Grade VI:	Experimental..	65	1.47	.277	.....		
	Control.....	65	1.77	.315	.30	.419+	.7
Grade VII:	Experimental..	63	2.13	.251	1.69	.359+	4.7
	Control.....	63	.44	.257	.....		
		VOCABULARY TEST					
Grade V:	Experimental..	62	2.77	.392	.....		
	Control.....	62	2.78	.391	.01	.554	.02
Grade VI:	Experimental..	65	1.85	.349	.28	.469—	.6
	Control.....	65	1.57	.313	.....		
Grade VII:	Experimental..	63	2.47	.274	1.13	.376	3.0
	Control.....	63	1.34	.258	.....		
		MONROE READING TEST					
Grade V:	Experimental..	62	—.47	.188	—.43	.274	1.6
	Control.....	62	—.04	.199	.....		
*Grade VI:	Experimental..	65	.26	.146	.60	.223—	2.7
	Control.....	65	—.34	.168	.....		
Grade VII:	Experimental..	63	.52	.195	.....		
	Control.....	63	1.00	.222	.48	2.95+	1.6

*Note: The experimental and control groups of Grade VI were far from being equally matched on initial Monroe Comprehension Test and it is doubtful if the results in this case are comparable.

gains for the experimental groups; in Grade VI, an insignificant excess gain for the control groups. It seems reasonable that the control groups should make greater gains on a test in fundamental operations because the chances are that this group of pupils had devoted a greater amount of time to practice on the fundamental operations. At least, the amount of time devoted to the use of the practice booklets reduced greatly the amount of time which the pupils in the experimental groups might have used in practice on the fundamental operations.

5. The gains on the vocabulary test are approximately the same for the two groups, except in Grade VII where there is a significant excess gain in favor of the experimental group.

6. The gains on the Monroe Silent Reading Test suggest a superiority of the control group in Grades V and VII and of the experimental group in Grade VI. Altho this condition is rather surprising in that the practice exercises have a tendency to stress careful reading, the scores on the comprehension aspect of the Monroe test were slightly superior in the control group to those in the experimental group. However, it should be pointed out that the pupils in the experimental group attempted less exercises at the final testing and were more accurate in their reading, i.e., their rate of reading had been reduced but they read more accurately. Thus, the superior comprehension score of the pupils in the control groups did not result from more careful reading but from the fact that they attempted more exercises than the pupils in the experimental groups. These facts suggest that training in accuracy in reading may result in accuracy at the expense of speed. At least, it may be suggested that rate of reading is not improved by practice which emphasizes only accuracy.

In general, the results indicate that the use of reading exercises did aid in the solution of verbal problems in arithmetic. The superiority of the experimental group was not so large as might be desired, but when one recalls that the investigation lasted only ten weeks, the results are fairly satisfactory.

In evaluating the results, two other factors should have consideration:

1. Comparison of the gains made in both the experimental and control groups with the gains usually made on the same tests by pupils thruout the country, indicates that both groups of pupils made much greater gains than are usually achieved. On the Buckingham Problem Scale, the pupils gained, during the ten-weeks' period, amounts usually equivalent to those resulting from a whole year of instruction. It should also be pointed out that the teachers of the control group exerted every effort possible to secure maximum results from their pupils. Reports from supervisors in the systems in which the investigation was conducted suggested that any superiority of the experimental over the control group would represent real superiority since it would be earned in competition with the best teaching which the teachers in the control group were capable of giving.

2. Consideration of the gains made by individual pupils in the two groups suggests that there were more uniform results from the ex-

perimental groups. A greater percentage of pupils made some gains, altho the variation in the gains was not as great as in the control group. This fact suggests that the use of the practice exercises guarantees greater progress of a greater percentage of pupils, altho it may retard the progress of some of the more capable ones.

An Investigation to Determine the Transfer Effects of Three Different Methods of Teaching Three Different Types of Examples in Two-Place Addition

This second investigation, which has grown directly out of the results of the various testing programs in arithmetic directed by the writer, deals with the problem of transfer of training. Examination of the results obtained from the giving of any extensive testing program involving the fundamental operations suggests that every number situation is a specific situation and that the only method for guaranteeing mastery of the various combinations is to give specific drill on each and every one of them. One investigator, making an intensive study of the results of extensive testing programs in arithmetic, and after making a detailed analysis of the errors made in the solution of the exercises involving the fundamental operations, suggests that instead of teaching the so-called "45 principal combinations" in each of the four fundamental operations, making 180 combinations in all, teach 1,680 combinations. This author suggests that teachers have a misplaced faith in the doctrine of transfer and that the inadequacy of this theory is largely responsible for the lack of mastery in the fundamental operations. His antidote is a large dose of specific training, altho he admits that sooner or later a pupil does acquire the ability to make generalizations. He admits transfer but suggests that the child's ability to generalize needs a much greater amount of specific training for its development than is usually given. In last analysis, then, the problems of transfer resolve themselves into the questions of when and how the child acquires the ability to generalize and whether methods of teaching can facilitate this process of making generalizations.

The writer has been responsible for directing several investigations to throw light on various phases of this problem, but time precludes mention of more than one. This investigation is being submitted this spring by James Robert Overman as a doctor's dissertation in Education at the University of Michigan.[3]

Statement of the Problem. The purpose of the investigation, as stated by Mr. Overman, is to study the effect of instruction on three types of examples in two-place addition upon the pupil's ability to handle closely related types in three-place addition and in two- and three-place subtraction, and to determine whether the amount of transfer is a function of the method of teaching. Stated more specifically, the purpose of the investigation is to determine the relative effect on

[3] Overman, James Robert. *An Experimental Study of Certain Factors Affecting Transfer in Training in Arithmetic.* (Unpublished doctor's dissertation, University of Michigan.)

the amount of transfer of four methods of teaching the three types of examples mentioned. These four methods of teaching are as follows: (1) teaching the examples as specific number situations, without any attempt to accomplish more than to get the correct responses to the situations set; (2) teaching the examples and attempting to aid the child in developing a generalized method of procedure for use in attacking similar types of examples; (3) teaching the examples and rationalizing the process with the hope that such rationalization will develop the ability to attack successfully similar types of examples; and (4) teaching the examples with emphasis on both generalization and rationalization in the hope that this type of teaching will give the power to attack successfully new types of similar examples. Thruout the investigation the first type of teaching is considered the control type and the other types, the variables.

Different Methods of Teaching. A brief description of the four methods of teaching will be given in order that the nature of the variables may be thoroly understood. These methods will be referred to as Methods A, B, C, and D, respectively.

Method A. The pupils were shown how to perform the process. There was no generalization or consideration of underlying principles. For example, in teaching the pupils how to add a two-place, a two-place and a one-place number, in the order stated, $\begin{array}{r} 52 \\ 32 \\ 3 \\ \hline \end{array}$ the teacher simply showed the pupils how to write and add the numbers.

Method B. The pupils were helped to formulate general methods of procedure from the specific types taught. These generalizations were constantly emphasized thruout the teaching. In teaching the type of example given above the teacher not only showed the pupils how to write the numbers but also helped them to form the generalization that they must always be written so as to keep the right-hand column straight. This will be called the method of generalization.

Method C. The reasons and principles underlying the specific types taught were discussed with the pupils. The formulation of general rules of procedure was avoided as much as possible. In teaching the type of example given above, the pupils discussed the principle that ones can only be added to ones and tens to tens, but nothing was said about keeping the right-hand column straight. We will call this the method of rationalization.

Method D. General methods of procedure were formulated and the underlying principles were discussed. In the type of example previously used as an illustration, the pupils were helped to the conclusion that the right-hand column must be kept straight in order to add ones to ones and tens to tens. We will refer to this as the method of generalization and rationalization.

Each teacher following a given method of instruction was given a very definite outline of procedure for each of the fifteen days covered by the investigation. The director of the investigation had a conference

with the various groups of teachers previous to the beginning of the investigation and reviewed the different steps in the method of instruction to be followed. Furthermore, the director or someone designated by him supervised the instruction of the different teachers during the period of the investigation.

All four groups of pupils under consideration were given the same type of practice. This practice was partly abstract drill and partly practice in applying the abstract processes to concrete situations. The practice was confined to the specific types of examples taught (Types 5 to 9). The groups all received the same total amount of instruction and practice, but the methods of instruction employed with Groups B, C, and D required more time than that used with Group A. This resulted in less practice and more instruction for Groups B, C, and D.

Control Group. In most experiments of this type, provision is made for a group which is given the test-series but is not given the training or practice. Such a group is usually called a control group. No group of this type is provided for in this experiment. There were two reasons for this. In the first place, it was found to be impossible to secure such a group. To make the testing analogous to that of the other groups, it would have been necessary to give the test series four times, extending over a period of fifteen days. No second-grade teacher was found who was willing to take this much of the pupils' time especially since no instruction in arithmetic could have been given during the period.

In the second place, no such group is essential to the primary purpose of this experiment, namely to measure the increase in transfer due to generalization, rationalization, and generalization and rationalization combined. For this purpose it is sufficient to compare each of Groups B, C, and D to Group A, with which neither generalization nor rationalization was employed. Group A, therefore, becomes the control group for the purposes of this experiment.

The Test Series for Measuring the Effectiveness of the Methods. The series of tests, given at the beginning and end of the investigation and twice during its course, consisted of 56 examples involving 29 different types of exercises. Type 1 consisted of 10 addition combinations like 4 plus 2, and 3 plus 4; Type 2, one-place addition with three addends, like 3 plus 2 plus 2; Type 3, one-place addition with four addends; Type 4, five subtraction combinations, the reverse of the addition combinations; Type 5, two-place addition with two addends; Type 6, the same as the fifth type, except that the numbers were dictated and the child had to write them and add; Type 7, two-place addition with three addends; Type 9, addition of a two-place, a two-place, and a one-place number; Type 11, addition of three-place addition with two addends; Type 14, three-place addition with four addends; Type 17, subtraction of a three-place number from a three-place number; Type 27, subtraction of a two-place number from a three-place number, etc. In all of these different types of exercises each example differed from the one preceding it by just one factor. Type 2,

for example, differs from Type 1 in that there are three digits to be added instead of two, but these three digits are so chosen that adding them makes combinations which the pupils have already been taught. Thus, the difference in the two types is not the learning of new combinations, but the adjustment to a column of three instead of two digits. Likewise, Type 5, consisting of adding two two-place numbers differs from Type 1 only by the fact that the example in the former consists of two columns of figures to be added. Thruout the whole set of test exercises, with the exception of Exercise 29, no new combinations are involved and the only variable is in the number of places and addends in the examples to be added and in the number of places in the minuend and subtrahend in the examples to be subtracted.

The Method of Conducting the Investigation. This investigation was conducted in Grade II of the public schools of Toledo, Bowling Green, and Findlay, Ohio. In 1927-28 twenty classes in Toledo and one in Bowling Green were involved; in 1928-29, sixteen classes in Toledo, fourteen in Findlay, and one in Bowling Green. The investigation was planned for pupils knowing the combinations of examples of Type 1 of the test, one-place addition with three addends (Type 2 of the test), one-place additions of four addends (Type 3 of the test), and the five subtraction combinations (Type 4 of the test), but the children were not expected to know anything about addition and subtraction involving two- and three-place numbers.

Preliminary to the investigation, the different classes were divided roughly into comparable groups on the basis of the results on mental tests, judgment of social environment of the schools, and the quality of teaching in the different schools. In each of the different groups twenty minutes per day for fifteen days were utilized in the investigation. Eight days were used for testing and as much practice as the time would permit; seven days for instruction and practice. The complete time schedule was as follows:

First and second days: first testing with test series
Third day: instruction on the addition of two numbers of two digits each (Types 5 and 6)
Fourth and fifth days: practice on Types 5 and 6
Sixth and seventh days: second testing
Eighth day: instruction on addition of three numbers of two digits each (Types 7 and 8)
Ninth day: practice on Types 5, 6, 7, and 8
Tenth and eleventh days: third testing
Twelfth day: instruction on addition of a two-place, a two-place, and a one-place number in the order stated (Type 9)
Thirteenth day: practice on Types 5, 6, 7, 8, and 9
Fourteenth and fifteenth days: fourth testing

It should be pointed out that knowledge of the first four types of examples in the test were presupposed and that instruction was given only on Types 5 to 9, inclusive. The method of teaching varied in each of the four groups, one group using Method A; one group, Method B; one group, Method C; and one group, Method D. The purpose of the

investigation was to determine the influence of the teaching of Types 5 to 9 on the other twenty types of examples and to determine whether the different methods of teaching had any influence on the amount of spread.

Method of Tabulating the Data. After the close of the fifteen days in which the investigation was conducted, four matched quartets of children were selected from the total number of those participating. The children constituting these quartets were matched on five points: sex, mental age, chronological age, score on the preliminary test, and the teacher's estimate of general scholastic ability. Naturally matching on all of these points was not perfect, but the central tendencies and the deviations therefrom showed there were no significant differences between any pair of groups.

The amount of spread or transfer resulting for the different methods of instruction was measured by the gain in the percentage of possible improvement on succeeding repetitions of the tests. If the influence of teaching were confined simply to the type of examples on which the instruction was given, then there would be no gain on other types of problems contained within the tests, but if the influence of instruction tended to spread, then other types of examples should be solved on the retest. Thus, the possible amount of spread to other types of examples was the basis for measuring transfer.

The data were tabulated to show the amount of spread, the influence of mental ability on spread, the influence of sex on spread, the influence of type of example on spread, the influence of method of teaching on spread, the evidence of spread in the errors made in the answers to the examples, etc.

Results. For the purposes of this paper only one tabulation and a general statement of results will be presented. The tabulation, showing the percentage of the examples solved correctly on the first and last testing, is ample evidence of the rather large amount of spread or transfer resulting from the different types of teaching. There was almost as much gain on the types of examples on which no definite instruction was given as on the types on which instruction was given. However, it should be pointed out that the greatest amount of carry-over was to examples most nearly like those on which instruction was given.

Other important findings of this investigation are as follows:

1. The results indicate that all four types of instruction produced a transfer effect to related types of examples. There was some transfer for 99.1 per cent of the pupils. The mean amount of transfer in the group taught by the most favorable method was 72.4 per cent of complete transfer. In this group, 15.2 per cent of the pupils obtained 100 per cent transfer. On different types of examples, the amount of transfer varied from 42.1 to 90.4 per cent.

2. On the examples closely related to the types on which instruction was given, there was little difference in the amount of spread from the four methods of teaching.

TABLE II—PERCENTAGE OF EXAMPLES CORRECT ON FIRST AND LAST TESTINGS

Group	Number	Type of Examples: Description	First Testing	Last Testing
Taught before beginning of experiment	1	1+1[a]	95.0	98.0
	2	1+1+1[b]	87.2	96.8
	3	1+1+1+1	82.5	93.7
	4	1—1	86.1	94.2
Taught during experiment	5	2+2[c]	43.2	96.5
	6	2+2 (dictated)	51.1	96.4
	7	2+2+2	37.4	93.1
	8	2+2+2 (dictated)	45.8	95.3
	9	2+2+1[d]	19.9	93.3
Not taught	10	2+2+2+2	35.3	87.7
	11	3+3	36.3	93.5
	12	3+3 (dictated)	35.5	85.7
	13	3+3+3	30.0	88.4
	14	3+3+3+3	27.1	82.6
	15	2—2	43.7	87.3
	16	2—2 (dictated)	38.2	84.8
	17	3—3	35.7	84.4
	18	2+1+2	17.0	92.9
	19	1+2+2	13.6	76.8
	20	1+2+1	10.0	71.4
	21	3+2	3.3	56.2
	22	2+3	4.2	47.1
	23	3+1	7.8	64.7
	24	1+3	3.6	55.8
	25	2+3+1	2.5	46.0
	26	2—1	14.4	63.4
	27	3—2	2.1	47.3
	28	3—1	6.8	57.3
	29	Carrying in addition	1.3	4.1

Note: *a*. This notation represents the addition of two numbers of one digit each.
b. This notation represents the addition of three numbers of one digit each.
c. This notation represents the addition of two numbers of two digits each.
d. This notation represents the addition of two numbers of two digits each and a number of one digit, the latter coming last (at the bottom).

3. The method of instruction emphasizing the process of generalization produced the greatest amount of spread. The other methods ranked in the following order: instruction emphasizing both generalization and rationalization, second; that emphasizing rationalization, third; that emphasizing specific instruction, fourth. The influence of the different methods varied somewhat as different factors were isolated but the above ranking held for the results of the total group.

4. The pupils with the higher mental ages made the greatest amount of transfer. There was some evidence that instruction emphasizing generalization and rationalization was most effective with the pupils having the highest mental ages. There were no significant differences in the methods with the pupils of low mental ages.

5. The greatest amount of transfer to similar types of problems occurred on the test immediately after the instruction had been given.

The import of the results from this investigation suggests that the method of teaching has a definite influence on the amount of transfer; also, that if proper methods of teaching are utilized, the number of specific combinations needed for giving complete mastery over the skills involving the fundamental processes may be less than the 1,680 which one of four recent investigators suggests.

Case Study of a Girl in Grade VIIB Who Was Doing Unsatisfactory Work in Arithmetic[4]

The third investigation for consideration is a report of the method of diagnosis of the arithmetic difficulties encountered by a girl in Grade VIIB, and the type of remedial treatment suggested. The results obtained from the general testing program and the report from her teacher suggested the girl was a subject for careful study and prescription. The one making the study administered a battery of mental and achievement tests and utilized a stenographer for making a detailed report of the child's efforts in the oral solution of given verbal problems. The one conducting the investigation and the stenographer attempted to get a complete description of the child's behavior. They kept all papers on which the pupil worked and took notes of everything which she did in the hope that they might understand the mental processes involved in the difficulty encountered.

General Statement. Mary S., a girl in Grade VIIB, was reported on February 29 as failing in arithmetic because of (1) lack of interest, and (2) unsatisfactory oral response and written work. She was reported as doing B work in music, C work in literature and reading, and E work in arithmetic.

Diagnosis. School Record. Records showed that her chronological age was 12 years and 1 month; her mental age, 13 years and 2 months. Her score on the National Intelligence Test gave her a grade-level of 6-0 and an intelligence quotient of 109. She has been in school seven years, has repeated Grades IIA and IIIB, and has skipped no grades.

Sociological Record. She was born in the United States of Roumanian parents. Both Roumanian and English are spoken in the home. The father is employed as a conductor. The family has moved three times, but each time the child has attended a graded city school. She has had both visual and tonsillary trouble.

Results from the Diagnostic Tests. Table III, exhibiting the results given in the attempt to ascertain the nature of her difficulty, reveals that she achieved less on the Stevenson Problem Analysis Test than the usual child at the beginning of Grade V. On the Wisconsin Inventory Test, her achievement in the exercises involving simple addition, those involving division with zero quotients, and those involving long division was approximately that of a child at the beginning of Grade IV; on the remaining tests of this battery, her achievement was that of a child at the beginning of Grade VI. On the Sangren-Woody Read-

[4] The writer is responsible to Vernon E. Chase, Director of Research, Public Schools, Fordson, Michigan, for this study. In this study Mr. Chase made the diagnosis and remedial suggestions at the request of the regular classroom teacher.

TABLE III—NATURE OF THE TESTS GIVEN AND THE GRADE-LEVEL ACHIEVEMENT GIVEN AT THE BEGINNING AND END OF THE REMEDIAL PERIOD

Test	Grade-Level Achievement		School Months Gain
	February	June	
Stevenson Problem Analysis Test	4-8	5-8	10
Wisconsin Inventory Test:			
Simple addition	4-0	6-0	20
Simple subtraction	6-0	6-1	1
Simple multiplication	6-0	6-2	2
Short division	5-11	5-2	9
Higher addition	6-0	6-0	0
Addition involving carrying	7-4	7-4	0
Division involving zero quotient	4-4	8-0	36
Long division	4-0	.....	.....
Sangren-Woody Reading Test:			
Word meaning	6-3	9-0	27
Rate	5-6	5-0	—6
Answering fact questions	5-4	4-0	14
Checking total meaning	5-0	6-0	10
Checking central thought	10-0	7-0	30
Following directions	7-0	8-0	10
Organization	7-0	8-0	10

ing Test, her achievement was from a half-year to a year below normal on all tests except involving the picking out of the central thought, on which she attained a score approximately two years more than could be reasonably expected.

Stenographic Account of Pupil's Responses and Behavior in Solving Verbal Problems. The following is a stenographic report of the teacher's and pupil's responses at a conference in which the teacher was attempting to analyze the difficulties which the pupil was encountering in solving verbal problems. The stenographer attempted to record not only the conversation taking place between teacher and pupil but also other types of responses or reaction made. In the report the problem will be reproduced and under it the responses and reactions made by teacher and pupil. The letter "T" is placed before the reactions of the teacher; the letter "P" before those of the pupil. Quotation marks are used to indicate conversation, and the absence of these marks indicates some other type of activity.

PROBLEM I

A family uses 2 quarts of milk per day. What does it cost this family per week for milk when milk is 12c per quart?

T. "Work the problem on this sheet of paper telling aloud everything you do. If you do not know what to do, ask a question. I will work the problem on my sheet of paper at the same time to see if we both get the same answer."
P. "2 qts. a week and the milk is 12c for one quart. 2 x 12 is 24c."
T. "Is that the right answer? Is that what the problem calls for?"
P. "Oh, yes, you multiply 7 by 2 is 14 times 12c is $1.68."

T. "Is that what the problem asks for?"
P. "How much it costs them per week."
T. "Yes, how much does it cost them per week for milk?"
P. "$1.68."

PROBLEM II

A baker made the same number of loaves of bread each day. In 7 days he made 5,614 loaves. If he received 9c per loaf, how much money did he receive per day?

T. "Try this next problem in the same way as you did the one before."
P. "A baker made the same number of loaves of bread each day. Do it just the same as the two quarts of milk. 5614 x 9c is $505.26."
T. "What is $505.26?"
P. "That is how much he made each day."
T. "Number of loaves? Why did you multiply 5614 by 9?"
P. "To find out how much it would cost."
T. "All right. How much did it cost?"
P. "$505.26."
T. "Is that the answer to your problem? Is that what is asked for?"
P. Hesitates and works on paper. Divides 505.26 by 9.
T. "Why did you divide by 9?"
P. "To see how much money that is."
T. "Tell me what you should do to find out how much he receives per day."
P. Hesitates.
T. "Ask some questions if you wish to."
P. Hesitates.
T. "That is how much he made per week. We want to find out how much he made per day. If we know how much he made per week, how can you find how much money he made per day?"
P. "Divide."
T. "Divide what?"
P. "Nine."
T. "Why will that give you how much he made per day? Why don't you divide by 7?"
P. "That's right, because there are 7 days in a week."
T. "See if you can get it."
P. Gets $72.18.
T. "What is that?"
P. "How much he got per day."
T. "All right."

PROBLEM III

Mary and Ann decided to earn money during their vacation by picking berries. They received 19c per crate. Mary picked 27 crates and Ann picked 28 crates. How much more did Ann earn than Mary?

T. "Try this next problem in the same way as you did the one before."
P. "Multiply 27 by 19."
T. "Why?"
P. "Because they are 19c per crate and Mary picked 27 crates."
T. "All right, let's try it."
P. Multiplies and gets $2.53.
T. "Did you multiply by 9 or 19?"
P. Finishes multiplying and gets $5.03.

P. "To see how much Ann earned multiply 19 x 28. That is $5.22. Take away $5.03 from $5.22. That would be 19 crates more."
T. "19 crates?"
P. "She made 19c more."
T. "All right. That is pretty good."

Analysis of Errors. Observation of the pupil taking the tests in the fundamentals, consideration of the responses made, and analysis of the stenographic report revealed the following types of errors:

Involving Fundamental Operations:

1. Does not know combinations, especially those involving 5 and 7. Unable to carry out accurately divisions involving zero quotients.
2. Has great difficulty with long division, averaging not more than one out of three problems correct.

Involving Reasoning:

1. Her score on Stevenson A and Sangren-Woody 3-4 indicates difficulty in comprehension.
2. Makes random attack. Attempts solution before getting problem conditions in mind.
3. Has the habit of working problems by rote, i.e., solving a set of problems by applying the same method and processes to all that she does to the first one.
4. Lacks retentive power. Loses essential elements of problem from mind while attempting to find others. (See answers 9-10-11-15-16.)
5. Attention span very short.
6. Thinks backwards. When subtracting 203.79 from 306.95 she says: "Take 306.95 from 203.79."

Remedial Suggestions. Upon the basis of the preceding diagnosis, it was recommended that the following types of drill be given:

Involving Fundamental Operations:

1. Drill upon Tables 5 and 7. Use *Schorling and Potter Practice Exercises,* Tests 2-3-6-12-14.
2. Drill on zero quotients. See *Buckingham-Osburne Arithmetic, Book One,* pp. 287-92.
3. Drill on long division. Excellent suggestive material in *Buckingham-Osburne Arithmetic, Book Two,* pp. 263-5. Follow with *Schorling and Potter Practice Exercises,* Tests 29-37. Time 50 minutes.

Involving Reasoning:

1. Give intensive drill in the silent reading of verbal problems. Expose verbal problems beginning with short simple exercises, such as may be found in the first book of any series of grammar-school arithmetics.
2. Use flash cards for speeding up the interpretation of reading oral problems.
3. Have the pupils read a problem orally and tell or write the story of the problem.

4. Drill on answering such questions as the following concerning each problem read:
   What is called for?
   What must we know before we can tell what is called for?
   Which of the things are given in the problem?
   What things must be found in some other way?
   How shall we find them?
5. Give drill in reading verbal problems and telling the processes to be used and the order in which they should come, but without obtaining the solutions. However, it may be well to have the pupil estimate a reasonable answer.

Results. Approximately ten minutes per day, three days per week, of individualized practice of the types outlined was given by the regular teacher in addition to the practice usually gained in the class recitation. According to the plan, the time for one day per week was to be devoted to drill on the fundamental operations and the other two days to the drills involving the reasoning exercises. The teacher was given instructions to vary the drill as the pupil's interest and progress dictated, but to confine the total amount to ten minutes per day.

Table III, previously presented, indicates the changes brought about by approximately a semester of this type of training. On the Stevenson Problem Analysis Test, the girl made a gain equivalent to a year's progress. On the Wisconsin Inventory Test, she made a gain equivalent to two years' progress on the simple addition test; a gain representing three years' progress, on the test involving division with zero quotients; on the other tests of the Wisconsin Inventory Test, there was little change in status except that she lost in her ability to solve exercises in short division. On the Sangren-Woody Reading Test she made substantial gains on the tests for word meaning, checking total meaning, following directions, and organization; she lost on the tests involving rate, answering fact questions, and in checking central thoughts. In general, her teacher felt that she was making more progress than the tests showed. The teacher felt that the girl's attitude was much better and she was much more interested in her work because she felt that someone was directly concerned about her welfare. Incidentally, it may be added, that while the pupil's progress may be significant, the most outstanding part to the case study was the teacher's growth in professional interest and zeal. It is fairly safe to predict that the progress made by the girl under consideration was insignificant compared to the progress made by the other pupils thru the improved instruction resulting from the intensive study and treatment given to the case under consideration.

Impressions of the German School System

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THIS paper, presenting some impressions of the German school system, is an outgrowth of the writer's experiences resulting from a tour of the educational institutions of Germany, conducted during the summer of 1929, and from a rather intensive study of recent literature dealing with education in Germany since the establishment of the Republic.

Background of the Tour

The International Institute, of Teachers College, Columbia University, was established in 1923 under the direction of Professor Paul Monroe, at that time Director of the School of Education. The Institute was made possible thru a gift of $1,000,000 to be paid in ten annual installments by the International Board of Education (one of the boards founded by John D. Rockefeller, Jr.). The purpose of the grant and the subsequent founding of the International Institute was the support and development of the work of foreign students in education and for the study of educational problems in the countries from which these students come.

In attempting to realize the purposes underlying its establishment, the Institute has engaged in many types of activities, such as advising students from foreign lands and providing them opportunities for visiting typical American schools, preparing special courses on American education based upon the needs of foreign students, offering scholarships to a limited number of foreign students and special grants to exceptional educators from foreign lands, and engaging in research activities dealing with educational problems of foreign countries. By thus engaging in the activities whereby foreign students may study American educational problems and American students may study the educational problems of other nationalities, it is hoped that some progress toward international understanding and good will may result.

The Direction of the Tour

During the summer of 1929 the International Institute, in coöperation with the Zentralinstitut für Erziehung und Unterricht (in connection with the Ministry of Education in Berlin) organized and directed, for the benefit of a group of American educators, a tour of Germany, offering opportunity for first-hand study of the various aspects of the German school system. This tour of American educators studying the German educational institutions may in a way be thought of as a return-visitation, for in 1928 the two agencies just mentioned organized

and directed, for the benefit of a group of German educators, a tour offering first-hand study of various phases of public education in the United States. Because the tour of American educators was a return-visitation, it was all the more profitable and enjoyable, in that it offered opportunity not only for studying the German school system, but also for renewing friendships begun in America during the previous year.

Three individuals were outstanding in the organization and direction of the tour: Dr. Thomas Alexander, of the International Institute, who served as the American supervisor of the visitation group and who was responsible for selecting and organizing the group here in America; Dr. F. J. Nieman, of the Zentralinstitut für Erziehung und Unterricht, who was business manager of the tour and was responsible for all details concerning transportation and entertainment; and Dr. Erich Hylla, of the Ministerium für Wissenschaft, Kunst, und Volksbildung (Ministry of Education), who was the German educational leader of the tour and who was largely responsible for determining the particular cities to be visited and the phase of education to be studied, and who served as interpreter on many occasions. These three directors accompanied the American visitation group most of the time and did their utmost to make the tour educative and enjoyable.

The Personnel of the American Visitation Group

The American visitation group consisted of thirty-three members selected from approximately five hundred applications. The personnel consisted of twelve professors from colleges or universities, two instructors from teachers' colleges, two superintendents of schools, two assistant superintendents of schools, two supervisors of elementary instruction, one director of special education, one high school principal, one elementary school principal, eight high school teachers, and two elementary school teachers. Of the twelve professors, eight were professors of Education; two, of modern language; one, of mathematics; one, of finance. Of the eight high school teachers, two were teachers of German; one, of physical education; and one in each of the following fields: commercial subjects, mathematics, English, and history. The members of the group were selected from eighteen states, representing all different sections of the United States, and included a representative from each of the foreign countries, Syria, Scotland, Brazil, Japan, and Chile. The representatives from these foreign countries had been studying Education in the United States an were returning to their native countries for participation in educationa work. It is evident that the visitation group represented a wide geographical area and was cosmopolitan in its interests.

Schools Visited

The tour started in Hamburg on June 16 and ended in Münster on July 26, altho the writer left the group at Mainz on July 12. One phase of education was studied in each of the following places: Hamburg, Harburg, Lübeck, Berlin, Magdeburg, Halle, Weimar, Leipzig, Dresden, Chem-

nitz, Nürnberg, Munich, Heidelberg; Odenwaldschule (a special boarding-school in the country), Frankfürt, Mainz, Wiesbaden, Bonn, Cologne, Dusseldorf, Barmen, Eberfeld (special school), Essen, Gesel Kirchen Dortmund, and Münster. The tour was planned to give a picture of the German school system as a whole. Consequently all types of schools were observed and studied. Among those visited were the following: elementary schools, secondary schools, vocational schools, nursery schools, industrial schools, trade schools, schools for household arts, technical high schools, teachers' training schools, universities, rural schools, boarding schools, and experimental schools in both the elementary and secondary fields. In visiting these different types of schools, those responsible for the tour selected those which represented the best developed and most progressive tendencies in the particular type of school under consideration. The schools were not selected at random, but in order to portray vividly a given aspect of German education.

In addition to visiting different types of schools, every effort was made to have the group come into contact, as much as possible, with the existing educational organization and machinery and with educational agencies and movements. Thus, the ministry of education in the different states, and teachers' unions and homes of the teachers' union in the different states were visited and studied. Special attention was given the Youth Movement and a day was spent at one of its most renowned camps. Arrangements were made by which the group attended the theater and the opera and visited museums, so that any relationships which these institutions had to the school program might be pointed out. The trip was planned so that the visitation group had the opportunity to see the work of the teachers and pupils in their school excursions and in their vacation schools. Thus, the scope of the visitation was much broader than the mere observation of classroom work in the different cities. In fact, there were so many activities which took the group away from the classroom, that certain members asked for the omission of some of them and the addition of more classroom visitation.

General Entertainment of the Visiting Group

Thru the untiring efforts of Dr. Nieman, a systematized plan of entertainment was followed. While there was some variation in the order of events, there was in every city visited a reception and dinner given by the burgomaster and city officials in the Ratshaus (City hall or a building like the capitol building in our states); a reception and dinner by the "Lehrers Verein" (Teachers' Organization) in the building which the teachers' organization itself owned; a tea or reception or a reception and dinner by the ministry of education of the given province; or a tea, reception, or reception and dinner by any outstanding educational agency existing within the city under consideration. In many of the schools visited within a given city, the plan of entertainment called for a special breakfast, tea, or dinner.

At each of the enumerated types of activities, addresses were given setting forth something of the history of the city or state, outlining the school system, or describing a given phase of education. Often the

school children themselves participated in the program thru pageants, plays, dances, or musical numbers. At most of the meetings, yearbooks, monographs and various types of printed exhibits were distributed to the visiting members in order that they might have possession of materials to aid them in a more intensive study when more adequate time was available.

A Typical Day

The visitation program was definitely organized and was carried out with meticulous care. The schedule for Friday, June 21, one of the five days spent in Berlin, is reproduced in order to show something of the nature of the program provided and of the great detail with which it was planned.

8:30	Walk to Zentralinstitut für Erziehung und Unterricht
9:00	Greetings by the Director of the Institute
9:15– 9:45	Address by Gertrude Baumer, "The German School System"
9:45–11:00	Group discussion and visit to the display of "Exhibits from the German Schools"
11:30	Breakfast in the Rheingold
12:15	Trip to the State Art School
12:30	Address by Professor Philipp Franck, "The Training of the Drawing Teacher"
12:50	Address by Professor Theile, "The Training of the Teacher of Industrial Arts"
1:15– 3:00	Visit to exhibits of drawing and industrial arts
3:25– 4:15	Presentation of the Marionette Theater in the auditorium of the Art School
4:15– 4:30	Visit to Professor Johannesson's laboratory in which teachers are trained to make apparatus for physics
4:45	Trip to the building occupied by the Department of the Interior
5:00	Reception by the Minister of the Interior, with tea in the Minister's garden
6:00	Trip to home of the Teachers' Union
7:00	Dinner with the Berlin Teachers' Union
10:30	Return to the hotel

The schedule for any other day of the tour may have varied somewhat in the nature of the activities engaged in, but on almost every day every moment of the time from early in the morning until late at night was set aside for some specific thing. The tour was strenuous, but it could not be otherwise if the German school system was to pass in review in the six weeks available for the tour.

A Few Outstanding Events of the Trip

Every day of the trip was a memorable one, full of educational and interesting experience. It is really unkind to those responsible for providing the entertainment to single out particular events as outstanding,

but it seems that this group will be most interested in three special features of the tour: the visitation of the theater and opera, the day spent at Hohenstein (one of the most famous of hostels of the Youth Movement), and the day spent at Wegscheide (one of the famous vacation schools of Germany).

The Opera and the Theater. The visitation group, while the writer was a member of the party, attended the opera at Berlin and at Dresden, and the theater at Weimar. At Berlin, we were privileged to see Gounod's *Faust*; at Dresden, the opera *Xerxes;* at Weimar, Schiller's *Kabale und Liebe.* At Berlin we were the guests of the Minister of Education of Prussia; at Dresden, of the Minister of Education of Saxony. In both of these cities the visitation group had what some might term the honor of occupying the royal box, which in the days of Imperial Germany was occupied by the Kaiser. Lest this group marvel at the generosity of the entertainment provided by the Ministers of Education, it should be pointed out that the courtesy extended was no great extravagance. The opera in Germany, as well as the schools, is a state function and is under the jurisdiction of the Minister of Education. This situation, coupled with the fact that the German people, as a whole, have not sufficient money to afford the higher-priced seats at the opera, made it rather easy for the ministers to reserve the block of seats for the visitation group. The operas, with their beautiful scenery, were magnificently rendered and were greatly appreciated by all. However, the group was especially interested in the fact that the opera and the theater are closely allied with the schools of the provinces. As previously pointed out, the Minister of Education has supervision of both the opera and the schools. This arrangement makes possible inter-relations between the opera and the theater which are unknown in America. Among these special features is the reservation of a large block of good seats at every performance for the school children of the provinces. These seats are sold to the children at a very nominal price, enabling them to see the best of performances for a mere pittance. The children from various sections of a province often take advantage of the opportunity and come in large delegations. No doubt, this privilege has contributed a great deal to the love of the German people for music and drama.

The experience at the theater at Weimar illustrates another relationship between the school and the theater. The presentation of Schiller's *Kabale und Liebe* was primarily for the benefit of the one thousand school children, from twelve to fifteen years of age, who had collected from all sections of Germany to devote the week to study the lives of Goethe and Schiller. These groups of children, with their teachers, had visited the Schillerhaus, the Goethehaus, the church in which the men were buried, and everything else of interest at Weimar connected with these great men. Schiller's play was presented as a culmination of the week's study. Since the presentation of this production was for the children, they almost completely filled the theater. After the play, the outdoor balcony was reserved for the visitation group to observe these thousand school children march with flaming torches in various formations on the

square in front of the theater and finally place a wreath on the double statue of Goethe and Schiller. This ceremony, with the flames of the torches piercing the veils of the surrounding darkness, was conducted with a solemnity that made a profound impression on the visitation group and must have left indelible memories in the minds of the school children participating. After reviewing the work of this group of children during this week and viewing this spectacle, the group felt that it had a deeper insight into the cultural development and patriotic loyalties of the German people.

Die Jugendberg Hohnstein. The day spent at Die Jugendberg Hohnstein, one of the best known hostels of the Youth Movement, portrayed another side of German life and education. Die Jugendberg Hohnstein is a little village about two hours' ride by bus from Dresden. The little village has a most picturesque setting in the wooded foothills overlooking the winding Elbe. The principal interest centers in an old castle which stands on the edge of the high and rocky banks of the river and provides a wonderful opportunity for surveying the river, the woods, and the valleys of the surrounding country. This castle, built in the fourteenth century, was originally a knight's castle and then became in turn a robber's den, a state building, a prison, a reform school, a prison again, and finally a Jugendherberge. With all of its thrilling and historic past, it now serves as an overnight and vacation home for the youth of Germany. The interior of the castle has been entirely remodeled, providing large dormitories for boys and girls, a large auditorium, living rooms, and a large modernly equipped kitchen. Some idea of the size of the castle may be gained from the fact that it was equipped to keep 1,000 people over night at one time. The highest number ever kept over night was 1,700, and the highest number fed at any one time was 3,600 at one midday meal. The cost of food and lodging at the castle is twenty pfennigs (five cents) for bed and forty pfennigs (ten cents) for breakfast. In the year 1927, 51,011 guests remained over night in the castle. Of this number, 8,402 were pupils from the higher schools, 13,529 from the Volkschule, and 29,080 youths who had completed school. At this castle there is a caretaker and his wife who have general managerial control. They look after the kitchen, answer correspondence, make the reservations for the different groups, and have general supervision of the activities. The youths themselves and their teachers assume responsibility for their own social affairs and entertainment. They may spend their evenings in singing, dramatics, lectures, stunts, or anything else which they desire. The organization has certain house rules to which all are supposed to conform, but these are the products of the youths, themselves, and not of the house manager. When one considers that Hohnstein is but one of over 2,300 such hostels in Germany, the significance of the Herberge as an educative and socializing influence becomes apparent. These Herberge are situated about a day's hike apart so that the youths may travel from place to place. They may stay from one night to two weeks at any of the Herberge, but usually migrate from place to place, coming into first-hand contact with the different phenomena of nature, famous historical sites,

and variations in the social life and structure of the different provinces. The training received in traveling together and in living together in such places as Hohnstein, the acquaintances made thru meeting people from all sections of Germany and even from the neighboring countries, is most valuable for the social responsibilities which these youths must eventually bear and promises to make for the unit of the Republic which was so sadly lacking in the days of the empire.

Kinderdorf Wegscheide. The day spent at the Kinderdorf Wegscheide was another memorable day. Wegscheide is an old military camp situated approximately fifty miles from Frankfürt. The word "Wegscheide" itself means the dividing of the ways. It is in reality a cleared, level spot on the top of one of the highest wooded hills in that section of the country. From the cleared spot it is possible to see for miles and miles in almost every direction. This spot was the training-ground for the German soldiers during the war and is surrounded with old military barracks. At the present time, instead of being used as a military camp, the site has been converted into a vacation school. At the time the visitation group was at the school, approximately a thousand children were in attendance. Many of these children come from Frankfürt, but others come from Berlin, Hamburg, Leipzig, Dresden, and many other cities of Germany. It is the ambition of every child in Frankfürt, and of the school authorities in that city as well, that he shall have the privilege of spending his month at Wegscheide.

When the long-expected opportunity comes, a whole class and its teacher move bodily for one month to this school site. Upon arriving there, the members of this class and of the other classes proceed to elect a mayor and organize a council for directing the affairs of the large group of students attending. One of the teachers is elected as mayor, but the pupils themselves serve on the council. The military barracks are assigned as the living quarters and the groups assigned to a given barrack assume responsibility for decorating it and for seeing that it is left in as good or better condition than it was when they came. The decorations were most interesting and some suggested signs of real creative ability. It is interesting to note that the children prefer the old military barracks to the newly constructed ones which have recently been added, because the old barracks offer greater opportunity for creative effort in decoration. The children are extremely happy for they are having both vacation and school. For three hours a day they have definite instruction in science, health, nature study, history, literature, and music. It might not be out of place to mention that the instruction includes some home economics, for during the month's stay at camp each child is assigned some responsibility in connection with the preparation and serving of food, the planning of the meals, the washing of dishes, and caring for the barracks. All instruction centers around actual experience. Instruction in science is based upon the things seen on hikes thru the woods and valleys; instruction in history is based upon the historic spots visited; and literature and music often take the form of story-telling around the campfire in the evening. Surely, instruction of this type is based upon meaningful experience and leads to real mastery and appreciation.

However, the extra-curricular values of this school experience made fully as great an appeal as the instructional values to the visitation group. Here were approximately one thousand children from all sections of Germany, living together, studying together, playing together, for one month. They come from different provinces and are unacquainted at the time when they come, but as a result of their association during this month they become unified in spirit and loyalty. Around the campfire in the evening the children of the different provinces sing their songs, tell their stories, relate incidents concerning their provinces and their home life, and entertain the whole group with various types of stunts illustrating the lives of their people. It was really inspiring to see these children marching to the tune of their improvised German band, singing in the kitchen as they pared the potatoes or capped the strawberries for the noon meal, folk-dancing in front of the barracks for the amusement of themselves or the pupils from some other province, or assembling in one vast circle on the top of the hill for one of the programs in which all children participated. Unity is the slogan of the school and all of the members pledge themselves to contribute something to the blood-stream of Wegscheide. The mailed fist is the emblem of the school, but instead of signifying an instrument for warfare and fighting fellow-men, it is symbolic of a force for fighting everything that is low, deceitful, mean, or vulgar. "Wegscheide" may mean the dividing of the ways, but this school is certainly making a more wholesome and unified Germany. The influence of one month's stay at this school upon the boys and girls, if they are impressed in anything like the manner the visitation group was, must be a mighty force for making them not only better citizens of Germany but of the world.

Some Observations on the School Situation in Germany

It is impossible, within the scope of a short paper, to summarize the trends in education in any country and it is rather hazardous to attempt to generalize the trend of education in a country in which the educational policies are changing as rapidly as they have been during the last few years in Germany. Nevertheless, an effort will be made to point out what appears to the writer as trends and to indicate some of the evidence suggesting these trends.

The Rôle of the Teacher. The teacher in Germany plays a very significant rôle in German life. It is said that the teachers in America have a very important influence in American life, but it appears to the writer that the rôle of the American teacher is not nearly so significant as that of the German teacher. The teachers of Germany as a whole are well trained and by tradition hold positions of influence. The organization of the teachers gives evidence of their power. The Lehrersvereinhäuser (teachers' buildings) owned and operated by the Teachers' Unions in such cities as Berlin, Nürnberg, Hamburg, or Dresden indicate the power and significance of the teaching body. The teachers' building in Berlin, owned and operated by the teachers of the Volkschule in Berlin, is a large, three- or four-story building, with a dining-room and cafeteria, a large auditorium, a number of smaller committee rooms, and

a library with a regular librarian caring for its thirty thousand volumes. It is the natural center of the professional and social life of the elementary teachers of that city. The teachers' building in Hamburg is even more pretentious than that in Berlin. The visitation group, while in Nürnberg, lived at a hotel owned by the teachers of that city. They apparently have their headquarters in a portion of the building and lease the remaining portion to be used as a hotel. These teachers' buildings are by no means the dilapidated and worn-out buildings which you might think of teachers occupying in America. They were as fine as any of the buildings within their respective cities. They are not quite as pretentious as the Michigan Union at Ann Arbor or the Indiana Union which Indiana University is planning to build, but they are structures which do credit to any professional body. When consideration is given to the large number of such buildings owned by the teachers of Germany, one has some material evidence of the important part played by the teacher in that country.

Other evidence of the significant rôle played by the teacher in Germany lies in the fact that many of the teachers hold important political offices in their local communities or even in the Reich itself. One of the principals of an elementary school in Hamburg is a member of the Senate of that city. Recent statistics show that seven teachers are numbered among the membership of the Reichstag. Willy Helspach, candidate for the presidency of Germany, just previous to the time of the election of Hindenburg, is a professor at the University of Heidelberg and a member of the Reichstag. On several occasions during the tour it was pointed out to the visitation group that the teachers constitute the present royalty of Germany. The royalty of the old order has been destroyed, but the teachers with their organizations, their wealth as indicated by the teachers' buildings, and their positions of power before the war constitute about the only group comparable to the old royalty.

The superior rôle of the teacher is nowhere more outstanding than in the classroom. Here he (I say "he" because a majority of the teachers in Germany are men) is supreme. In the last analysis, he determines what, when, and how a subject is to be taught. He may receive a brief course of study from the central office stating that English literature is to be taught in a given grade, but the teacher selects the material and teaches it as he pleases. The teachers in Hamburg elect the superintendent and principals of the Volkschule for a period of three years, and it is no idle fancy to suggest that if these officials were inclined to meddle with supervision of instruction that they might not be re-elected. Either of these officials may visit the classroom teachers, but they cannot force changes. Any supervisory suggestion, unless voluntarily adopted by the teachers, must be approved by a council made up of teachers and members from the community at large. It was stated a moment ago that the principal and supervisor may visit the teachers but it should be added that they must obtain permission of the teachers before doing so. It may seem strange to Americans, but the German schools are open to visitation only by consent of the ministry of education, the superintendent, the principal, and finally the teacher. Since

the teacher's prerogatives are supreme in his own classroom and since he teaches what he pleases and when he pleases, it should be evident to a group of supervisors that there is no use in Germany for standardized tests. The training of the teacher is supposed to be sufficient to enable him to make his own curriculum, devise his own methods, supervise his own instruction, and to measure the results of his own teaching. Under such circumstances, it is readily seen that the teacher in Germany plays a much more significant rôle than the teacher in America.

Interest in the Extension of Education. The pride of the democratic school system of America has been the so-called educational ladder extending from the kindergarten to the university, free and open to anyone who wishes to make the climb. It is well known that, in the days of the German empire, the privilege of higher education was limited almost exclusively to the five or ten per cent whose favored birth and position allowed them to attend the secondary school, but with the coming of the Republic there has come the movement for the extension of the opportunity to attend the higher schools. The slogan in Germany is not our open ladder scheme, allowing anyone with the desire a chance to climb, but instead the slogan reads "the open road for the capable." Modifications in the German school systems of the Republic have made it possible for easy entrance to the secondary schools through the Aufbauschule. However, any applicant for admission to the secondary school must pass satisfactorily what is called a "leaving examination." By means of this examination, effort is made to select only those who are capable of profiting by higher education.

The entrance requirements to the Hochschule and to the universities have been somewhat modified and liberalized so that greater opportunity for attending these institutions is possible. Students from a greater variety of schools have been given the privilege of taking prerequisite examinations for entrance and the examinations themselves have been changed to cover a broader range of subjects. The visitation group was told of a mature man who wished to attend one of the German universities. When he presented himself for examination, he stated that he did not know whether he could pass the examinations in the regular subjects but told the examining board that he had traveled extensively in a certain country and knew well all the facts concerning this country. The examining board allowed him to take his examinations on this country and then on a basis of his examinations admitted him to the university of his choice. Such an action was unheard of in the days before the Republic.

This interest for the extension of education is manifested in the Folk Colleges. These are institutions of higher learning which people who completed the Volkschule in pre-Republic time may attend. It will be recalled that in the days of the Empire the children of the common people attended the Volkschule and were not given the privilege of attending the higher institutions of learning. With the coming of the new government and with the erasure of class distinction, there was a movement for extended educational opportunity for those who had not previously had the privilege of higher education. To meet the needs of these people who

were not prepared to attend the regular institutions of higher learning, Folk Colleges were established. At the present time, more than 250 of these colleges have been established in Germany. The fundamental purpose underlying the establishment of these institutions is to disseminate a broader culture and to provide for the unity of the German nation thru the inculcation of a common culture. These Folk Colleges are of two types: the evening schools and the boarding schools. Thousands of people between the ages of eighteen and twenty-five have taken advantage of the opportunity offered and have later presented themselves for entrance to the universities.

This interest in the extension of education, and in giving better education, is manifested in the movements for the education of girls in the Frauenschule and for adult education. In the Frauenschule, the training involves such courses as home economics, nutrition, infant care, hygiene, child welfare, civic education, and sociology. These Frauenschule are usually in connection with a secondary school from which students have the privilege of entering the university. Some disconcerting problems arise when the girls finishing these schools clamor for recognition by the universities. Programs for adult education are sometimes the outgrowth of local community interest in the management and welfare of the schools. At one time the state had control of the schools, but with the coming of the new government the people seized this control. Near Magdeburg, the parents, teachers, and pupils formed a corporation and rented an old fort which now is being used as a country school home. Parents have, within the last three years, devoted 25,000 hours' work to making this old fort into a suitable school site. They devote some time each week to labor at this school. A teacher directs both the work of the pupils and of the adults, and the coöperative undertaking is proving a great educative experience for all concerned.

Health Education. Germany is placing great emphasis on health education at the present time. The close of the war found Germany filled with children who were undernourished, weak in body, stunted in bodily growth, and subject to all types of ravishing diseases. Thus, one of the first problems of the country was the reclamation of the health of its children. More extended medical inspection was introduced in the schools, programs of physical exercise were formulated, sun rooms in which the children might take sun baths in the nude were recommended and established in connection with many schools, orthopedic classes were formed and special exercises given, outdoor play and pageantry were featured in order that the children might have the benefit of fresh air, and special agencies were instituted for the feeding of the children. In this connection, it is interesting to indicate that, as the visitation group was studying the school at Lübeck, it was pointed out that the policy of giving milk to children in the middle of the forenoon was a remnant of the relief work started by the Quakers of this country, and that the idea of a central kitchen in Frankfürt in which the food for all of the children in the schools of the city is cooked and then distributed thruout the various schools was the result of the work of Herbert Hoover in his administration in European relief work.

This interest in getting children into the fresh air and the sunlight caused the German people to look with more favor than ever on the school journey. In some schools the regular routine is to take the children out into the open on two afternoons per week. At Lübeck, at one time, it so happened that the school building which was being remodeled was not ready at the beginning of the school year and the teachers and pupils journeyed into the country, spending a whole month tramping thru the woods, along the streams, over the mountains, and thru the dales. This need for sunshine and fresh air has caused a steady growth in the Youth Movement. As has been previously stated, in 1926 there were 2,300 hostels for youths in Germany. During that year the number of guests entertained was 2,107,000. Of this number, 30 per cent were pupils from the elementary schools; 32 per cent, pupils from the secondary schools and universities; and 38 per cent, young working people. These statistics indicate something of the extent to which children in the schools are engaged in the movement. It is true that the Youth Movement is more than a health movement, but its contribution to the health of the children is one factor that makes parents look on it with favor. This same desire for fresh air and sunshine is partly responsible for a movement for the establishment of "Landheime," or rural schoolhouses, for children. Many of the more progressive schools purchased or leased country homes to which the children may be taken for week-ends or even for a day. These homes are usually located where there is opportunity for fresh air and sunshine, often in the woods or on the edge of a lake. They are usually equipped with a kitchen where simple food may be cooked, some classrooms, and a library. A plot of land for school gardens usually surrounds the schools. Regular instruction is given while the children are in attendance, altho science, gardening, nature study, and health receive more than ordinary attention. The Landheim, no doubt, adds to the reality of much of the instruction; it may serve, in a way, as an antidote to so much wandering in connection with the Youth Movement; and it certainly does provide opportunity for bringing children from the crowded city into the more healthful open country.

Training for Social Responsibility. The coming of the Republic in Germany has brought the necessity of training children for the responsibilities of future citizenship. A manifestation of this type of training exists, to some extent, in the general routine of all schools, but mention should be made of some outstanding illustrations. The activities of the Youth Movement with its mighty influence provides opportunity for discussion and learning and for a discovery of the possibilities and capabilities of the youth of every section of Germany. It provides practice in planning, coöperation, social organization, and to a certain extent democratic living. In the Odenwaldschule, an experimental school near Heidelberg, the note of social responsibility is predominant in the training given. The school government is organized on the basis of student participation and the pupils apparently have a great deal of control in the management of the school and in the distribution of the activities of the dormitories, gardens, shops, dining halls, and classrooms. The Odenwaldschule is a coeducational institution—something of an innovation in Ger-

many—altho, since the war boys and girls have been admitted to some of the elementary schools and occasionally one hears a rumor that the presence of both boys and girls in the same primary class is a satisfactory arrangement. At this school the theory of social responsibility is carried to the extent that the pupils are housed in cottage dormitories with a housemother. The pupils, living in one of these dormitories, are selected with the idea of approximating family life as usually found in the homes of the community. Living in this cottage are the house-mother, two or three boys, and a similar number of girls. These boys and girls are of different ages, patterned somewhat after the ages of the children in an ordinary German family. Cottage responsibilities and relationships are managed and determined after the fashion supposed to be followed in the ideal home. The Odenwaldschule is extreme in its emphasis on social responsibilities, but the practices there are indicative of the type of training which is being undertaken in a less emphatic way in many of the schools of Germany.

Another evidence of training for social responsibility lies in the fact that the vocational schools are beginning to stress more liberal courses in connection with vocational training. In most of the vocational schools which the visitation group saw the principle of the continuation school is now being enforced. The principle underlying vocational education in Germany has been, in general, to make the individual a more efficient worker on the job at which he is engaged. Training offered centers rather narrowly around the knowledges and skills necessary to make the worker more efficient. This idea of vocational training was especially prevalent in southern Germany in the pre-war days. But the visitation group saw that in Chemnitz provision is being made whereby a boy may take some general courses which emphasize what we term household mechanics and social studies along with the courses training him for a given job. This greater liberality in the type of course which a pupil may elect is justified on the basis of extra-trade life. The writer understands that this tendency is manifested in several other vocational schools of Germany, but the vocational school in Chemnitz was the most outstanding illustration observed by the writer. The establishment of pedagogical institutes for the training of teachers is another indication of training for social responsibility. This new institution represents an attempt to build a training agency which will combine a high level of German scholarship and the fine social training stressed in connection with higher education in English universities. The ideal of the pedagogical institute is to stress scholarship, but at the same time to develop a fine social comradeship among instructors and students, thereby giving them better preparation for the social problems which they will encounter in adjusting themselves to the complex life with which they will be surrounded.

Searching for a New Philosophy of Education. At the present time Germany, in adjusting herself to the new order of the Republic, is searching for a new philosophy of education and of life. Almost all speakers, be they learned professors, school officials, or burgomasters, stress the need for a new set of values. Almost every one of more than one hundred lectures delivered to the visitation group emphasized this need. The

rapid rise of the experimental school during the post-war period is an indication of this groping for a new philosophy of education. Germany has long been famous for the experimental schools of Basedow, Pestalozzi, Froebel, Francke, and others. Altho the war was not necessarily a cause for the development of experimental schools, it was the medium that swept into a flame the existing experimental embers which had been lying somewhat dormant during the pre-war period. The major problem which these schools are facing is the determination of a type of training to fit best the people for life in a democracy. The experimental schools are in a very real sense the proving grounds for the different philosophies of education.

In this groping for a new philosophy of education and of life, the relationship of nationalism and internationalism is receiving great attention. The federal constitution adopted at Weimar in 1919, the Magna Charta of the new German schools, contains the provision that the schools shall attempt to develop a spirit of patriotism and loyalty to the Republic and at the same time stress the principle of the international brotherhood of man. The efforts to stress a pride in the local culture of the various provinces and a loyalty to these provinces and to the Republic are evident in the educational activities of the Folk Colleges, the community schools, the experimental schools, the Youth Movement—in fact, in almost all educational endeavor. Relative to emphasis on the spirit of international brotherhood, it is interesting to report a definite tendency for omission from textbooks of all passages concerning war and those which might tend to stimulate international hatred. In their stead are passages for inculcating the spirit of international peace and good will. Discussion of the peaceful formation of an economic United States of Europe is evidence of their thinking in terms of internationalism.

In this dualism, in which nationalism and international brotherhood play such prominent parts, the hiatus is the proper balance of the two factors. The pre-war philosophy emphasizing the distinctiveness and possible superiority of the German mind and culture, with its encumbent duty of overshadowing other minds and cultures, is passing; at the same time there is an ardent plea for the development and preservation of that mind and culture. However, great stress is placed upon the fact that a national mind and culture must develop in harmony with other nations and cultures. This idea is well expressed in what Professor Spranger in one of his lectures referred to as a symphony of nations, with each nation contributing its essential part and yet all playing in perfect harmony for a great symphonic effect. If one can judge from the addresses which the visitation group heard, the spirit of this new symphony in which Germany wishes to participate will be international peace, good will, and the brotherhood of man.

Enrollment by Subjects in North Central Association High Schools in Indiana, the First Semester, 1929-30

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IT is rather unnecessary before this group to explain the nature of the North Central Association of Colleges and Secondary Schools. It will be sufficient to state that, in the twenty states in which the Association is operative, there is a membership of 2,400 high schools, of which an even 100 were member schools last year in the state of Indiana. These schools practically coincide with the list of schools which have been granted a First-Class Commission by the State Department of Public Instruction. The exceptions are so few one way or the other that it is safe to say that this report, which characterizes the subject enrollment in Indiana North Central Association high schools, is also true of the First-Class Commissioned high schools in the state.

Every fifth year the Secondary Commission of the Association endeavors to obtain from each high school member the enrollment by subjects for the first semester of that year. It so happened that the present year was the one in which this report was requested from the various schools. Secretary Brown, of the Secondary Commission, presented his analysis for all twenty states at the annual meeting of the Association in Chicago last March. The report which is presented to you deals only with the analyses of subject enrollments as they concern the Indiana high schools.

It is not to be expected that any interpretations made or conclusions drawn from the data which are to be discussed necessarily give a picture of the situation as it exists in the 700 other high schools in the state, but such information as is brought to your attention may enable you, whether or not you represent a North Central Association high school, to compare conditions as they are found among these 100 high schools and those which exist in your own school.

Any attempt to analyze a mass of figures always encounters the difficulty of rendering the interpretation of such figures meaningful as well as interesting. It will not be my purpose to go into extreme detail in discussing every item found in the tables. I shall endeavor to point out only those items which might challenge you because of certain accepted notions in regard to the place of certain subjects in our high school curriculum and their possible value to the students who take them.

The first thing to which I wish to call your attention is that, if you compare my figures with those of Secretary Brown in the coming June issue of the *North Central Association Quarterly*, you will find certain

discrepancies; first, in the total enrollment found in Table I; and second, in the enrollments in mathematics and social studies courses. The reason for the first discrepancy is due to the fact that I have not included enrollments in the seventh and eighth grades, but have confined my study solely to the last three or four grades. The other discrepancy comes from the fact that certain courses not listed on the printed sheet filled out by the principals were included in the report. Secretary Brown classified these with those already listed. Since I have not had access to his method of classification, I have had to use my own.

One further explanation is necessary before I begin my interpretation of the data. Since there were exactly 100 of these high schools last year, it will be very easy for me as well as for you to transfer the number of schools offering any one subject into a percentage figure. This situation will make it easier to express proper relationships between schools.

TABLE I—PUPIL ENROLLMENT IN ONE HUNDRED INDIANA NORTH CENTRAL ASSOCIATION SCHOOLS 1929-30

Grades	Enrollment of Boys by Grades	Per Cent of Enrollment of Boys	Per Cent of Total Enrollment	Enrollment of Girls by Grades	Per Cent of Enrollment of Girls	Per Cent of Total Enrollment	Total Enrollment by Grades	Per Cent of Total Enrollment
9.....	10,247	31.4	15.7	9,702	29.8	14.9	19,949	30.6
10.....	9,445	28.9	14.5	9,380	28.8	14.4	18,825	28.8
11.....	7,177	22.0	11.0	7,217	22.0	11.0	14,394	22.0
12.....	5,767	17.7	8.8	6,388	19.4	9.7	12,105	18.6
Totals.	32,636	100.0	50.0	32,637	100.0	50.0	65,273	100.0

From Table I it will be observed that the total enrollment for boys is practically equivalent to that for girls. This means that in interpreting the percentage figures in Table II, all that is necessary in order to find the proportion of boys who are enrolled in any subject field is to divide the statement of percentage by two, since the percentage as recorded is in terms of the enrollment for both boys and girls.

TABLE II—ENROLLMENT BY SUBJECTS

Subjects	Boys	Per Cent	Girls	Per Cent	Total	Per Cent	Number of Schools
1. Mathematics—							
General Mathematics.....	1,246	1.9	678	1.0	1,924	2.9	24
First-year Algebra.....	8,574	13.1	7,265	11.1	15,839	24.2	95
Advanced Algebra.....	2,291	3.5	1,001	1.5	3,292	5.0	92
Plane Geometry.....	6,875	10.7	5,381	8.1	12,256	18.8	99
Solid Geometry.....	1,077	1.6	306	.5	1,383	2.1	70
Trigonometry.....	472	.7	73	.1	545	.8	30
Arithmetic for academic credit.....	933	1.4	1,091	1.7	2,024	3.1	30
Miscellaneous.....	35	.1	16	.0	51	.1	5
Total.....	21,503	33.0	15,811	24.2	37,314	57.2	100

TABLE II—Continued

Subjects	Boys	Per Cent	Girls	Per Cent	Total	Per Cent	Number of Schools
2. English—							
Freshman-year	9,805	15.0	9,341	14.3	19,146	29.4	96
Sophomore-year	9,189	14.1	9,151	14.0	18,340	28.0	100
Junior-year	6,794	10.4	6,705	10.2	13,499	20.6	100
Senior-year	3,042	4.7	3,394	5.2	6,436	9.9	100
Public Speaking	1,366	2.1	952	1.4	2,318	3.5	60
Dramatics	346	.5	548	.8	894	1.3	22
Miscellaneous	614	.9	502	.8	1,116	1.7	21
Total	31,156	47.5	30,593	46.8	61,749	94.4	100
3. Foreign Language							
Latin—							
First-year	4,242	6.5	4,675	7.2	8,917	13.7	99
Second-year (or)	1,854	2.9	2,521	3.9	4,375	6.7	62
Caesar	1,159	1.8	1,402	2.1	2,561	4.0	39
Cicero	496	.8	729	1.1	1,225	1.9	68
Virgil	333	.5	597	.9	930	1.4	63
Miscellaneous	13	.....	11	.....	24	.....	2
Total	8,097	12.4	9,935	15.2	18,032	27.7	100
Greek—							
First-year	67	.1	15	.0	82	.1	3
Second-year	55	.1	0	.0	55	.1	2
Total	122	.2	15	.0	137	.2	3
French—							
First-year	1,750	2.7	2,394	3.7	4,144	6.3	71
Second-year	949	1.4	1,429	2.2	2,378	3.6	71
Third-year	164	.2	316	.5	480	.7	34
Fourth-year	104	.2	178	.2	282	.4	8
Total	2,967	4.5	4,317	6.6	7,284	11.0	72
Spanish—							
First-year	1,148	1.7	978	1.6	2,126	3.3	23
Second year	544	.8	572	.9	1,116	1.7	25
Third-year	155	.2	148	.2	303	.4	11
Fourth-year	56	.1	77	.1	133	.2	1
Total	1,903	2.9	1,775	2.7	3,678	5.6	25
German—							
First-year	437	.7	309	.5	746	1.1	18
Second-year	278	.4	200	.3	478	.7	16
Third-year	43	.1	24	.0	67	.1	6
Fourth-year	11	.0	10	.0	21	.0	1
Total	769	1.2	543	.8	1,312	2.0	19
Total for all languages	13,862	21.2	16,595	25.4	30,457	46.6	100
4. Social Studies—							
Community Civics	3,052	4.7	2,761	4.2	5,813	8.9	47
Ancient History	2,233	3.4	2,169	3.3	4,402	6.7	29
World History	3,792	5.8	3,662	5.6	7,454	11.4	63
Mediaeval and Modern History	2,299	3.5	2,033	3.1	4,332	6.6	43
American History	7,224	11.1	7,402	11.3	14,626	22.4	100
English History	39	.05	37	.05	76	.1	3
Industrial History	279	.4	235	.4	514	.8	7
Government or Advanced Civics	2,790	4.3	3,048	4.6	5,838	8.9	88
Economics	1,428	2.2	1,321	2.0	2,749	4.2	63
Sociology	304	.4	365	.6	669	1.0	16
American Problems	395	.6	302	.4	697	1.1	11
Geography	197	.3	153	.2	350	.5	2
Miscellaneous	7	.0	2	.0	9	.0	
Total	24,039	36.8	23,490	36.2	47,529	73.0	100

TABLE II—Continued

Subjects	Boys	Per Cent	Girls	Per Cent	Total	Per Cent	Number of Schools
5. Science—							
General Science	973	1.5	949	1.4	1,922	2.9	13
Physical Geography	852	1.3	755	1.2	1,607	2.5	20
Geology	10	.0	19	.0	29	.04	1
Biology	3,618	5.5	4,340	6.7	7,958	12.2	84
Botany	1,274	2.0	2,154	3.3	3,428	5.3	38
Zoölogy	268	.4	281	.4	486	.7	5
Physiology	374	.6	444	.7	818	1.2	14
Physics	3,426	5.3	929	1.4	4,355	6.7	95
Chemistry	2,953	4.5	2,145	3.3	5,098	7.8	88
Miscellaneous	588	.9	522	.8	1,110	1.7	20
Total	14,336	22.0	12,538	19.2	26,811	41.2	100
6. Commercial Work—							
First-year Typewriting	1,880	2.9	5,724	8.8	7,604	11.7	93
Second-year Typewriting	403	.6	2,228	3.4	2,631	4.0	70
First-year Stenography	480	.7	4,415	6.9	4,895	7.6	92
Second-year Stenography	137	.2	1,952	3.0	2,089	3.2	68
First-year Bookkeeping	1,348	2.1	3,471	5.4	4,819	7.5	92
Second-year Bookkeeping	195	.3	433	.7	628	1.0	33
Commercial Arithmetic	1,653	2.5	2,920	4.4	4,573	6.9	61
Commercial Geography	592	.9	631	1.0	1,223	1.9	36
Office Practice	327	.5	957	1.5	1,284	2.0	54
Commercial Law	446	.7	414	.6	860	1.3	25
Business English	113	.2	196	.3	309	.5	15
Miscellaneous	207	.3	307	.5	514	.8	
Total	7,781	11.9	23,648	36.4	31,429	48.3	95
7. Manual Training—							
First-year	6,669	10.2	4	.0	6,673	10.2	
Second-year	3,693	5.6	0	.0	3,693	5.6	
Third-year	1,365	2.1	3	.0	1,368	2.1	
Fourth-year	834	1.3	2	.0	836	1.3	
Miscellaneous	43	.06	0	.0	43	.1	
Total	12,661	19.3	9	.0	12,670	19.3	
8. Household Arts—							
First-year	18	.0	4,807	7.4	4,825	7.4	86
Second-year	2	.0	2,132	3.3	2,134	3.3	72
Third-year	7	.0	863	1.3	870	1.3	39
Fourth-year	0	.0	825	1.3	825	1.3	27
Miscellaneous	0	.0	22	.0	22	.0	1
Total	27	.0	8,649	13.3	8,676	13.3	92
9. Agriculture—							
First-year	546	.8	0	.0	546	.8	32
Second-year	312	.5	2	.0	314	.5	26
Third-year	150	.2	0	.0	150	.2	17
Fourth-year	113	.2	0	.0	113	.2	14
Total	1,121	1.7	2	.0	1,123	1.7	35
10. Music—							
Chorus	1,975	3.0	4,130	6.3	6,105	9.4	60
Orchestra	1,574	2.4	1,290	2.0	2,864	4.4	88
Band	2,832	4.4	829	1.1	3,661	5.5	71
Glee Club	1,309	2.0	2,726	4.2	4,035	6.2	69
Miscellaneous	300	.5	340	.5	640	1.0	21
Total	7,990	12.2	9,315	14.3	17,305	26.6	99
11. Art—							
First-year	1,146	1.8	1,670	2.6	2,816	4.3	82
Second-year	418	.6	610	.9	1,028	1.5	51
Third-year	192	.3	345	.5	537	.8	29
Fourth-year	139	.2	232	.4	371	.6	24
Miscellaneous	1	.0	60	.1	61	.1	3
Total	1,896	2.9	2,917	4.5	4,813	7.4	92
12. Physical Education	1,706	2.6	1,732	2.6	3,438	5.2	5
13. Mechanical Drawing	683	1.0	17	.1	700	1.1	21

Mathematics

The first subject under consideration in Table II is that of mathematics. One-fourth of the schools offer some form of general mathematics, but, since the total percentage is only 3, we may be permitted to say that as yet such a course receives very little attention in our high schools. It will also be observed that not all first-year students are taking first-year algebra, altho one-fourth of the total enrollment is to be found in this subject. Since 30 per cent of the total enrollment is found in the ninth grade, the difference may be partially accounted for by the number of those who are enrolled in the courses in general mathematics. Another explanation may be on account of the way in which the schools reported their enrollment, since naturally a school which reports as a three-year senior high school would probably not indicate any enrollment in first-year mathematics. Since there were 6 high schools in Indiana which reported as three-year schools, and since Table II shows that only 95 schools offer first-year algebra, we may accept this as a fairly satisfactory explanation. In the case of plane geometry, it will be noted that every school except one offers this course. The influence of college entrance requirements is seen in the fact that 70 schools offer solid geometry, altho the percentage of those taking it to the total enrollment is only 2, while three times as many boys take the subject as do girls. In regard to mathematics as a whole, we find that almost three-fifths of the total enrollment is found in some one or more courses in this department. It is true that there must be a certain amount of duplication, that is, students enrolled in more than one of these courses, but since our report had no way of indicating such duplication, it will have to be surmised rather than definitely stated. Consequently, in the interpretation of gross enrollment and percentages, we must bear in mind that they are gross, not net.

A final observation to be made is that a difference of 9 per cent in favor of boys exists in regard to those who take work in mathematics. The only subject in which more girls take the course than do boys is advanced arithmetic. In every other instance there is a preponderance of boys.

English

The relationship between the total enrollment in first-, second-, and third-year English is seen to parallel very closely the total enrollment by grades. It is only when we come to the senior year that we discover a departure from the grade enrollment. One explanation may lie in the fact that some schools probably do not require a fourth year of English. Another one may be that the courses listed as public speaking, dramatics, and miscellaneous may make up for the difference. If we add up the percentages for the various offerings in the senior year, we find that a little over 16 per cent of the total enrollment is found in such courses. Since 18 per cent of the students are in the senior year, the chances are that the majority of them are taking some form of English, always allowing, of course, for a certain amount of duplication. One striking

difference between the enrollment by sexes as contrasted with the case in mathematics is that the percentages for boys and girls are practically the same in all cases.

Foreign Languages

The North Central high schools of Indiana offer five foreign languages, namely, Latin, Greek, French, Spanish, and German. It is to be observed that Latin enrolls almost 50 per cent more students than are found studying all other foreign languages. In other words, the ratio is practically 3:2. Of the total enrollment, 47 per cent is found to be taking some foreign language. A certain amount of duplication would naturally reduce this figure slightly. The most outstanding thing to observe is the tremendous drop which exists between the percentage of enrollment in the first year of any of these languages as compared with that in the second year. In Latin the drop is not quite so great as it is in French and Spanish. Not much attention needs to be paid to German and Greek because the enrollment in both cases is so small and the number of schools offering these subjects so few as compared with the others. The geographical location of Indiana is brought to the fore in the enrollment in Spanish. Only 25 of these 100 high schools offer the subject and the enrollment enlists only 6 per cent of the total school population.

It is fairly clear that there is much more persistency in Latin than there is in French and Spanish. However, a negligible number, so to speak, continue with third- and fourth-year work. One of the implications from this situation may be that Latin is rather firmly established as a two-year subject in our high schools and that modern languages are one-year subjects. In the case of Latin, over 60 per cent of the schools offer third- and fourth-year work. A decidedly smaller number offer this work in modern languages. The explanation for the offering of the third and fourth years of Latin may be on account of those who are offering four years of work for college entrance. In the case of modern languages, the striking situation is that only about half as many are enrolled in the second year as in the first. If this condition were to exist year after year, it would be perfectly legitimate to raise the question as to what happens to the language consciousness of those individuals who have had only one year of a modern language. I contend that it is a decided challenge to those who are training teachers in these languages as well as to the administrators who are including them in their curriculum offerings.

Social Studies

In the field of social studies there are two things to be especially noted. One is that American history, which enrolls 22 per cent of the total population, is practically coincident with the enrollment for the eleventh grade. In other words, it is the only subject definitely required of all students in the high school. There are certain social sciences which

are becoming definitely a thing of the past, namely, English history, industrial history, and political geography. The possible reasons for the retention of these three subjects in the curriculum is undoubtedly tradition more than any other factor. It is amazing how ancient history still persists. Of the schools, 30 per cent are offering the subject, with an enrollment of almost 7 per cent. It runs neck and neck with mediaeval and modern history, altho half again as many schools offer the latter subject.

One subject which is coming to the fore is that of world history. Over 60 per cent of the schools offer the subject and 11 per cent of the total enrollment is in this course. So far as frequency of offering is concerned, the course in civics is found most frequently, namely in 88 schools, with an enrollment of almost 9 per cent. Since this course in many cases is required in the last year, it would indicate that it is more than holding its own. The only specialized social studies course other than civics which seems to have any hold at all upon the high schools is that of economics. Sociology is undoubtedly a matter of personal interest on the part of the instructor who offers it.

Science

So far as this report is concerned, there are only three sciences which are receiving any consideration in our North Central high schools. In the order of the number of schools which offer them they are physics, chemistry, and biology; whereas in the matter of enrollment the order is biology, chemistry, and physics. It is to be expected that more students would be enrolled in biology because it is offered earlier in the course, but, when we think that 14 per cent, with some possible duplications, of juniors and seniors are taking physics and chemistry, one also begins to wonder as to what the nature of these courses is and how worth while they are to the students who take them. In this connection I urge you to consult the article by A. W. Hurd in the April 5 issue of *School and Society*.

In the complete report of the Secretary only 2 per cent of the students are taking botany, and only 269 out of 2,226 high schools, or 12 per cent, are offering it. In Indiana, on the other hand, 5.3 per cent of the students are taking botany and 38 per cent of the schools are offering it. Another difference between the report of the Secretary and that for the state of Indiana is to be found in the case of general science. In Indiana the total enrollment in this subject is only 3 per cent, with 13 per cent of the schools offering it; in the Association as a whole 12 per cent of the students are enrolled in the course and 1,443 schools, or 64 per cent, are offering it. To me this is one of the most interesting observations that I have been able to make in contrasting the two reports.

Zoölogy and geology have practically disappeared from the curriculum of today. In the Association as a whole physical geography in the five-year period has dropped from 5 per cent of enrollment to 2 per cent. Indiana has a slightly larger percentage, namely, 2.5, but there are only 20 schools which offer the subject.

Vocational Arts

The most outstanding observation to be made in regard to this field is that the same situation exists here as in foreign languages, namely, that the number of those who are taking the second year of the subject is not more than half the enrollment in the first year. One reason for this is to be found in the fact that fewer schools are offering second-year work than first-year work. Notice this situation in regard to typewriting, stenography, and especially bookkeeping. Three times as many students take first-year typewriting as second-year typewriting. Over twice as many take first-year stenography as second-year stenography and over seven times as many take first-year bookkeeping as compared with those who take second-year bookkeeping. There are almost twice as many in the first year of manual training as in the second year and over twice as many in the first year of household arts. Altho almost 50 per cent of the total enrollment is found in commercial work, much of this is undoubtedly duplication. This is the only vocational subject for both boys and girls in which there are three times as many girls as boys. Manual training, household arts, and agriculture are predominantly sex subjects, altho we find in each instance some few of the opposite sex enrolled. The only noticeable choice of opposites is that in first-year household arts where we have some 18 boys taking work. There are very few schools which do not offer work in commercial courses, manual training, and household arts, but there are only 35 schools which give any offering in agriculture. Twice as many schools give first- and second-year work as third- and fourth-year work. The enrollment is also pitifully inadequate, 1.7, as compared with 13 for household arts, 19 for manual training, and 48 for commercial work.

A question arises in this connection as to the extent to which these so-called subjects are vocational or general in character. That is, to what extent can the teacher in any one of these four fields give the first year of the work and consider that the individual who has taken it is vocationally prepared? I see no other conclusion to draw from the figures presented.

Music and Art

Music and art in some form are offered by practically every one of the 100 high schools. In music, orchestra seems to predominate. Band, glee club, and chorus come right together. More schools offer orchestra, but the largest enrollment is in chorus. My own interpretation is that one-tenth or more of the students in the schools are engaged in some form of singing activity, and that a somewhat smaller number are engaged in some form of instrumental work. Art is another one of these two-year subjects with a tremendous dropping off in the third and fourth years. Even at that we find only 4 per cent of the students enrolled in this first-year subject and about one-third as many in the second year.

No attempt was made to analyze the differences between art for appreciation and art for vocational preparation.

Physical Education

Schools were not asked to give their enrollment in physical education. Five gave this enrollment, but no comparisons can be made in the subject.

Mechanical Drawing

Mechanical drawing was not listed as a course in manual training because the Secretary in making his report put it as a separate subject. One-fifth of the high schools with a proportionate enrollment of 1 per cent are found in this particular field.

General Conclusions

1. The enrollment in mathematics and English is what might be expected, since these subjects are required to a certain extent.

2. Latin is offered to more students than all the other languages put together; Greek is a negligible quantity; German is coming back into its own; Spanish is a subject that is not taught in many Indiana high schools; French is the only modern language of any importance so far; and Latin is practically a two-year subject, whereas modern languages are practically one-year subjects.

3. Some old-type history offerings still persist in our high schools. American history is the only subject offered in every school. World history is coming to the fore.

4. Indiana high schools do not offer general science, which is a science recognized by the North Central Association for high school purposes. Biology is the most popular science, whereas more schools offer physics and chemistry.

5. Vocational subjects are, like modern languages, practically one-year courses. The challenge comes as to what should be done in this one year to make the content of the course worth while.

6. According to the Secretary's report, there has been an increase both in music and in art. The same situation is undoubtedly true of Indiana.

Such, in the main, are general observations that can be obtained from the data which have been presented to you. You may yourselves see others which you can apply or adapt to your own school systems, your final reaction depending upon the mote or the beam that is in your own eye.

Are Our Secondary Schools Improving?

H. H. REMMERS, Associate Professor of Education and Psychology, Purdue University

THE title of this paper is, like many such titles, somewhat too ambitious and ambiguous to be accurately descriptive. To delimit more concisely what I shall have to say would require some such description as "A Consideration With Some Evidence on the Question of the Extent to Which Secondary Schools Are Preparing Pupils for College Work at Purdue University, Together with Some Facts About College Standards." The lugubriousness of this description is, however, only partially compensated for by its greater definiteness; hence the shorter title.

It is at least conceivable that our high schools, to the extent that they improve their pupils' ability to do college work, would be retrogressing with reference to the life purposes of the 95 per cent of Indiana high school pupils who do not go to college. It is certainly not to be assumed that these life purposes and the educational needs that they presuppose are identical for those who go on to college and those who do not. This argument, however, is beyond the scope of the present paper. It will concern itself with improvement of high school pupils in relation to preparation for college work as defined by achievement on tests the general content of which is taught in high school, the scores being significantly correlated with first-semester marks in college.

The Problem

There has been much debate and considerable dogmatizing concerning the change in the quality of college freshmen over a period of years. The opinion is quite prevalent that in general the mental capacity of college freshmen has on the average shown an appreciable retrogression. The argument seemed plausible that the colleges were getting, during the last decade or two, a constantly increasing proportion of those of college age, and were, therefore, necessarily obtaining poorer student material, since presumably selection on the basis of ability was less rigorous than formerly, when fewer and more able students went to college.

There has not been wanting also the assertion that high schools in general provide less competent training than formerly in subjects which are particularly of a pre-college sort, such as English, mathematics, and, to a lesser extent, exact science such as physics. These assertions, however, have been less unanimous than those concerning the mental capacity of students, apart from training. While there has been practically complete agreement that present-day college freshmen are on the average natively less able than formerly, there have also been those who took up the cudgels for the high schools and argued that the increasingly better physical equipment of our high schools as well as rapidly rising

professional requirements for high school teachers must result in a proportionately better product in the way of graduates. It is probably not unfair to say, however, that the defenders of the high schools on these grounds have usually not been college professors of English, mathematics, or physics.

The debate concerning the whole subject has flourished particularly because of the dearth of facts on which the issue might be joined with profit to some pertinent end. This lack has fortunately been removed, for it has been made possible to obtain comparative data for Purdue University engineering freshmen after the ten-year interval from 1919 to 1929.

Procedure

On November 5 and 6, 1919, all engineering freshmen at Purdue University were tested as a part of a much larger investigation carried out by the Society for the Promotion of Engineering Education. The tests administered at that time consisted of six tests, as follows:[1]

I. Arithmetic (22 problems)
II. Algebra (12 problems)
III. Geometry (9 construction problems)[2]
IV. Intelligence
V. Physics (25 problems)
VI. Technical Information (100 multiple-choice test items concerning technical items of information which a person with engineering interests might be likely to acquire).

All the tests in the list, except the intelligence test, were again administered to the engineering freshmen at Purdue University exactly ten years after the 1919 investigation, i.e., on November 6, 1929. In addition to this, the Purdue English Test,[3] Form 1, was also administered both in 1919 and 1929. The intelligence test was omitted from the test program because it proved much less predictive of scholastic achievement in 1919 than did the other tests and is, moreover, apparently out of print.

The Data

In Table I and Figure 1 are assembled the data for convenient comparison of the average results for 1919 and 1929. Figure 1 gives a graphic representation of the extent to which the freshmen of 1929 exceeded the averages of those of 1919.

It is apparent that the superiority of the 1929 freshmen in all tests except Technical Information is marked and highly reliable statistically.

[1] For a detailed description of the tests and the results of the investigation, see L. L. Thurstone, "Intelligence Tests for Engineering Students," *Journal of Engineering Education* 13:263-318, January, 1923.

[2] The department of mathematics of Purdue University very generously coöperated by scoring all of the geometry tests.

[3] Devised by G. C. Brandenburg. The test is made up of seven different parts, covering grammar, punctuation, diction, literary information, two short reading paragraphs, spelling (recognition of misspellings), and vocabulary (synonyms). Form 1 of the test is no longer in print.

In computing the probable errors of differences it has been assumed that the variability of students for 1919 was approximately the same as in 1929. Unfortunately for our present purpose Professor Thurstone does not give measures of variability for the various institutions involved in the 1919 investigation. He does give (percentile) curves for the pooled results of all the institutions, and from these can be read approximations of the total variability for each test. The variability of all Purdue engineering students in 1929 is fairly close to that of the total variabilities shown in Professor Thurstone's study. Since Purdue averages for 1919 were appreciably below the averages of all institutions combined, the assumption that the Purdue students ten years ago were at least no more heterogeneous than those of 1929 is quite reasonable. The probability is that they were slightly more homogeneous then than now. Only in the case of the Purdue English Test were the primary data still available for all 1919 freshmen. These were kindly furnished by Professor G. C. Brandenburg of the Department of Education, and new tabulations and calculations of statistical constants were thus made possible. The raw scores on all tests for freshmen in mechanical engineering had fortunately been preserved by Professor G. W. Munro of the School of Mechanical Engineering so that direct comparisons of variability in this school were also made possible on all tests.

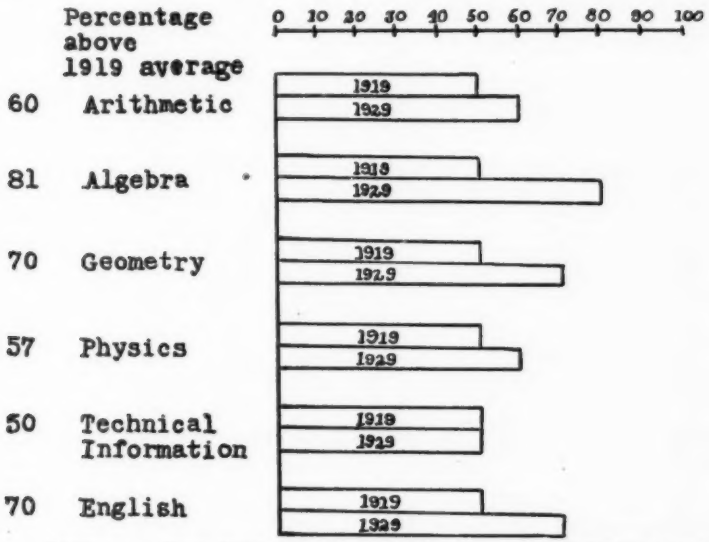

FIGURE 1. THE PERCENTAGE OF 1929 FRESHMEN EXCEEDING THE AVERAGE OF THE 1919 FRESHMEN.

Note: These percentages are based upon the assumption of a normal distribution, and were read from a table of areas under the normal probability curve. See Garret, *Statistics in Psychology and Education*, pp. 89-91.

TABLE I—COMPARISONS OF AVERAGES FOR PURDUE UNIVERSITY ENGINEERING FRESHMEN, 1919 AND 1929, FOR THE TESTS INDICATED

	Tests						Number of Students for each Test for the Two Years					
	Arithmetic	Algebra	Geometry	Physics	Technical Information	English	Arithmetic	Algebra	Geometry	Physics	Technical Information	English
1929 Average.	11.3±.09	4.7±.05	9.7±.08	10.7±.11	62.1±.24	123.8±.43	957	942	926	926	905	896
1919 Average.	10.3±.11	2.8±.06	7.8±.10	9.8±.14	62.2±.29	114.2±.54	593	594	589	590	584	670
Difference....	1.0±.14	1.9±.08	1.9±.13	.9±.17	.1±.39	9.6±.69						
Diff / P. E. diff	6.8	23.5	14.6	5.3	0.3	13.9						
In favor of....	1929	1929	1929	1929	1919	1929						

This table is read: The average score in Arithmetic in 1929 was 11.3. In 1919 it was 10.3. The difference of these two averages is 1.0, with a probable error of .14. The difference divided by its probable error is 6.8. Where this ratio is at least 4, the difference is statistically significant, i. e., it could never occur by chance.

TABLE II—COMPARISON OF VARIABILITY IN ENGLISH, 1919 vs. 1929, FOR ALL ENGINEERING STUDENTS

	Chemical			Civil			Electrical			Mechanical			Total		
	N	σ	σ_σ*	N	σ	σ_σ	N	σ	σ_σ	N	σ	σ_σ	N	σ	σ_σ
1919	134	20.33	1.24	137	16.38	.99	193	19.51	.99	206	20.80	1.03	670	20.64	.56
1929	128	19.80	1.24	158	18.50	1.04	262	17.87	.78	348	18.92	.72	896	18.94	.45
Difference		.53			2.12			1.63			1.88			1.70	
σ diff		1.76			1.44			1.25			1.26			.72	
Diff / σ diff		0.3			1.5			1.3			1.5			2.4	
Less in		1929			1919			1929			1929			1929	

*Kelley, T. L., *Statistical Method*, p. 176 The formula is $\sigma_\sigma = \frac{\sigma_{distr}}{\sqrt{2N}}$

TABLE III—A COMPARISON OF FRESHMAN SURVIVAL AND MORTALITY FOR 1919-1920 AND 1928-1929 IN ENGLISH COURSES INVOLVING CHIEFLY COMPOSITION

	First Semester				Second Semester†				First and Second Semester			
	Passed		Failed		Passed		Failed		Passed		Failed	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
1928	537	65.3	285*	34.7	240	67.2	117	32.8	777	65.9	402	34.1
1919	654	93.3	47	6.7	633	98.6	9	1.4	1,287	95.8	56	4.2
Percentage Differences		28.0		28.0		31.4		31.4		29.9		29.9

*Of these, 125 were required to register in English A, a non-credit course. They were failures in the same sense as those required to take Mathematics A.
†The second-semester grades are given only for English 1 and 10, which emphasize chiefly English composition.

By way of summary of Tables II and III, which give the relative variability measures for these data, it is fair to say that there is no evidence for any substantial difference between the two groups. While the averages have gone up very noticeably for the 1929 freshmen, there is no evidence that they are a more select sample of high school seniors than were the 1919 freshmen.

In contrast to the evident superiority of the freshman engineering students in 1929 as against those of 1919, it is of unusual interest to examine the trend in the proportion of freshman failures for the same time interval.

The increase in freshman mortality has been steadily growing over a period of years, as is evident from the last grade report for the

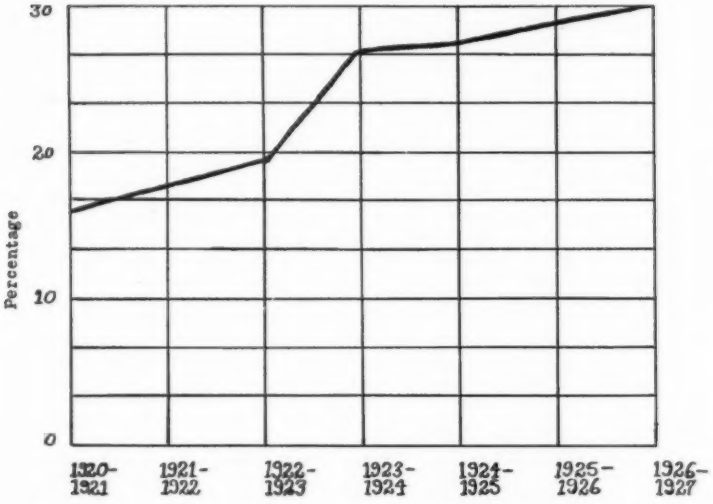

FIGURE 2. THE INCREASE IN MATHEMATICS FAILURES BY YEARS.

University, covering the period from 1920-1921 to 1926-1927. While freshman grades are not separately given in this report, the percentages give a quite accurate notion of the *trend* of freshman failures (not, however, of the freshman percentages, which are considerably higher), since their grades constitute more than half of all mathematics grades and include by far the major proportion of all failures in mathematics. As appears from Figure 2, the percentage of mathematics failures increased practically 100 per cent over the seven-year period.

Figure 3, based upon the grade report previously mentioned, shows the trend graphically for all English grades. Here again it is to be remembered that the percentage for freshmen would be very much higher than those shown in the graph. It is obvious that the rise in the percentage of failures in English has been much less precipitate than it has

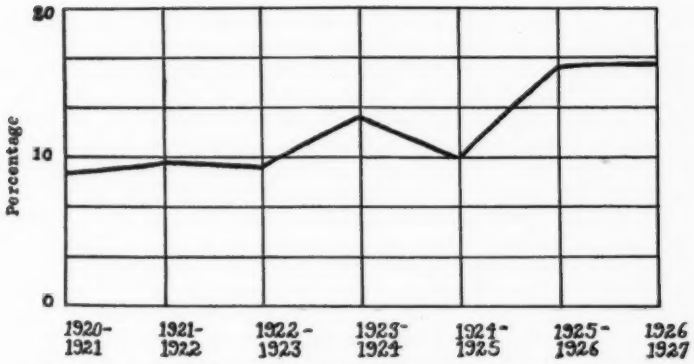

FIGURE 3. THE CHANGE IN PERCENTAGE OF ENGLISH FAILURES BY YEARS.

in mathematics. Indeed, the percentage of failures in 1926-1927 is slightly lower than for the preceding year—13.8 per cent as against 14.5 per cent.

Discussion of Results

The average differences observed in the test results for the two years, with the exception of the Technical Information Test, are pronounced and always in favor of the 1929 freshmen. How are these favorable differences with the accompanying rise in percentage of failures to be explained? Certain variables which have suggested themselves to me, and others which have been suggested by various ones of my colleagues, I herewith enumerate.

1. In 1919 the freshman mathematics course in the first semester was differently organized from the present course; trigonometry came first and college algebra last. The enormous difference observed in the algebra test results are then presumably in considerable part to be explained by the fact that the 1929 freshmen had had a rather thoro review of algebraic principles and manipulations, while those of 1919 had not. There, is, of course, some algebra involved in trigonometry, but certainly nothing like as thoro a review of high school algebra would be obtained in trigonometry as in college algebra. A certain amount of the observed difference in algebra—how much is unknown—must be credited to this change in the mathematics curriculum. It is not, however, reasonable to suppose that all the observed difference can be thus accounted for, because all other tests concerned with high school subject-matter showed large differences, and no opportunities for systematic review for these existed in 1929 that did not exist in 1919.

2. The geometrical construction problems are somewhat subjective as to scoring, and standards of scoring in 1929 may have been sufficiently less rigorous to account for a considerable portion of the difference here. This seems to me an unlikely explanation, especially in view of

the fact that English and geometry showed exactly the same amounts of differences. The scoring of the English test was completely objective.

3. The war, beginning in the fall of 1917, brought about a dilution of the male high school teaching personnel, owing to the fact that many men volunteered or were drafted for military service and were replaced in the profession by less experienced, less well trained, and generally less competent persons. This, however, could only have influenced the achievement in physics and to some extent possibly in English, and not in arithmetic, algebra, and geometry; for the 1919 freshmen were juniors in high school during the war period in question, and algebra is taught in the high school freshman year, while geometry comes normally during the sophomore year. Very little weight is therefore to be attached to this variable—all the less when it is recalled that the proportion of male teachers in our public high schools is quite small. The majority of 1919 Purdue University freshmen were taught in high school by women, who were not affected by the situation in question, except as industry might have provided more attractive war-time salaries, and this was hardly the case for women high school teachers.

4. The war may have had an indirect effect in that in 1919 a larger proportion of freshmen entered the University who had been in the service and had consequently been away from their high school training for a longer period than they otherwise would have been. A study of the freshman men enrollment figures for the years 1917-1918 to 1928-1929 shows this hypothesis to be invalid.[4] The figures are as follows:

TABLE IV—ENROLLMENT OF FRESHMAN MEN FOR THE YEARS INDICATED

Year	Number of Freshman Men	Year	Number of Freshman Men
1917–1918	557	1923–1924	838
1918–1919	1,347	1924–1925	976
1919–1920	1,106	1925–1926	1,029
1920–1921	902	1926–1927	1,151*
1921–1922	886	1927–1928	1,188*
1922–1923	857	1928–1929	1,294†

*Data furnished by the Registrar's office.
†First semester only.

It appears that there was a substantial decrease of 241 in the number of freshman men in 1919-1920 as against 1918-1919. It was apparently in 1918-1919 that the large number of soldiers and those engaged in industry returned. Indeed, the four years following 1919-1920 all show slight losses over each of the preceding years, and it was not until 1924-1925 that a gain in enrollment over the preceding year was registered. The current year (1929-1930) shows a rather large increase which might be argued to mean relatively less rigorous selection. In the

[4] Hatt, Elise, and McClusky, F. Dean. *A Study of Enrollment*, Bulletin of Purdue University, Studies in Higher Education II, November, 1926, p. 11.

study by Hatt and McClusky previously referred to, the graph for the total enrollment of the University shows the greatest drop in enrollment for the year 1919-1920 that has occurred in the entire history of Purdue University. There is certainly no reason to suppose that this sharp decrease was accompanied by a negative selection of high school graduates. Rather it seems more reasonable on the whole to assume in the absence of concrete evidence that there was at worst no selection and at best a tendency for the abler high school graduates to come to the University.

The question as to whether the students who did enter had been out of high school longer on the average than students in other years could, of course, be determined by a study of their age at entrance as compared with other years. In view of the enrollment facts it was not judged worth while to do this.

5. It has been urged that the amount of distraction from study to which college freshmen are now subjected is much greater than it was ten years ago, and that this would account for the general rise in the percentage of failures. There is obviously no exact criterion which can be applied in this case, but it seems reasonable to me at least to assume that the same distractions—extra-curricular activities, movies, automobiles, etc.,—have operated in a similar fashion on high school students. If this assumption be correct, there can have been no differential effect on college freshman achievement.

6. Finally, and most important, *the differences in test results seem to me to be best accounted for on the ground that the quality of high school instruction has improved in the period under consideration.* Both from the standpoint of physical equipment of high schools and the training of prospective high school teachers there has been obvious improvement.

As a somewhat rough but significant criterion of improvement in physical equipment of high schools in Indiana, we may take the per pupil cost of instruction. Taking each of the four-year periods preceding the two years 1919 and 1929, respectively, we have the following summary data of Table V.[5]

It appears, taking the value of the index number of the cost of living at its face value, that the average cost of high school instruction for the period 1925-1928 was $25.18, or approximately 58 per cent higher than for the period of 1915-1918. This difference is probably somewhat unfair to the more recent period, for there was considerable lag in the per pupil cost in the earlier period. The cost failed to keep pace with increasing inflation of the dollar. In any case, the difference does indicate some measure of actual increased expenditure for secondary education.

[5] For assistance in collecting the data on per pupil cost, I am indebted to Mr. Harley Talley, Director, Statistics Division in the Indiana State Department of Public Instruction.

TABLE V—PER PUPIL COST OF HIGH SCHOOL INSTRUCTION IN COMMISSIONED, CERTIFIED, AND NON-CERTIFIED HIGH SCHOOLS IN INDIANA FOR THE YEARS INDICATED

Year	High School Enrollment	Average Cost Per Pupil	Index Number of Cost of Living in U.S.*	Average Cost per Pupil Index Number†
1915.....	50,633	$55.48	105	$52.84
1916.....	69,719	55.84	118	47.32
1917.....	71,939	58.52	142	41.21
1918.....	77,695	60.85	174	34.97
Four-year period	269,986	(Weighted Average) 57.95		(Weighted Average) 43.17
1925.....	118,896	120.17	178	67.51
1926.....	124,205	117.29	176	66.64
1927.....	124,549	120.23	172	69.90
1928.....	131,497	118.33	171	69.20
Four-year period	495,147	(Weighted Average) 119.24		(Weighted Average) 68.35

*U. S. Department of Labor Statistics, *Monthly Labor Review*, Vol. 29, No. 2, pp 30-31. The index number is based upon the year 1913=100, and represents cost of food, clothing, fuel, light, and rent.
†This column is obtained by dividing the average cost per pupil by the corresponding index number, and thus makes the value of the dollar comparable thruout by eliminating the effect of inflation.

The changes in high school teacher licensing standards that have occurred in the ten-year period under consideration have also been highly significant. A letter from Mr. Roy P. Wisehart, State Superintendent of Public Instruction, may be summarized here.

(*a*) Since 1923, teachers' certificates have been issued only on the basis of training, where previously they had been issued on the basis of examination.

(*b*) At present, much more preliminary training is required of prospective teachers than formerly.

(*c*) Since 1928 no teacher not already in service can teach any of the regular academic subjects without completing a four-year college course.

After making all due allowances for the various factors previously mentioned, there seems to me to be little doubt that the improvements in secondary education have had a major influence in producing the favorable changes observed in the test results.

7. It has been suggested that the teaching in the University is now of sufficiently poorer quality to account for the greater percentage of failures accompanying a rise in the quality of the freshman's scholastic equipment. There is, of course, no objective criterion by which to test this hypothesis, but to maintain it certain assumptions have to be made which seem to me rather dubious. One must assume either that there is a negative selection among the products of our graduate schools who enter the college teaching profession or that they are more poorly taught now than formerly or that both of these factors operate. One

must assume further that there has been no change in standards in the University. Those conversant with the situation will agree, I believe, that there has been rather constant insistence within the ranks of college teachers that standards of achievement are not sufficiently rigorous and must be made more so. That this attitude should have had no effect upon practice when no well-defined objective standards of student achievement are available, is, to say the least, not very plausible.

Regarding the selection of college teachers, while I have no concrete data to present, I do not anticipate a serious challenge of the belief that, in general, they come from the upper fourth or fifth of the distribution of scholastic attainment.

The other assumption, that the present generation of college teachers are on the whole poorer because more poorly taught, comes to the same thing as the one just discussed, since it argues a progressive deterioration in the quality of college teaching.

All of this is, of course, not to say that the quality of college teaching cannot be greatly improved. On the contrary, I believe that the dissemination and application of modern psychological knowledge and especially the application of the experimental method to problems of education will pay very large dividends in terms of more effective teaching. The present argument, however, is concerned only with the present quality of college freshmen as compared with that of ten years ago. I believe it to be no worse, and probably better, now than then.

8. A steady, tho perhaps unconscious, rise in standards for freshman achievement most reasonably accounts for the general increase in the percentage of failures thruout all departments of the University. Whether this is good or bad will not be argued here. Viewed from a national standpoint, it might easily be argued that this increasingly rigorous selection is salutary in that the surviving students will be more competent to meet the competition of highly selected and trained engineers in other countries, and thus lead to a general rise in the effectiveness of our engineering technology. From a human and personal standpoint it might be argued that the rising academic mortality means an increase in frustration, unhappiness, and social maladjustment. These wider implications are outside of the scope of this study, which attempts only to interpret the data as they relate to the probable causes operating to bring about the observed results.

Summary and Conclusions

A decennial comparison of freshman engineering students at Purdue University on the basis of six identical tests showed a marked average superiority of the freshmen of 1929 as against those of 1919 in all tests the general content of which is taught in high school. The single exception is the test of Technical Information, *the content of which is not taught in high school.* Apparently the facilities for acquiring such knowledge have not noticeably improved. The evidence shows that there has been no significant change in the variability of the two groups compared.

Over the same period there has been a steady and marked increase in the percentage of freshmen failing in English and mathematics. This rise in the percentage of failures has been general in practically all departments of Purdue University.

The examination of a number of factors alleged to be operating within the University to cause the increase in failures led in general to the rejection of their validity. The most reasonable explanation is that of a rise in University standards.

In the interpretation of an assemblage of data beset by so many possibilities of fortuitous influences, it would perhaps be the part of discretion to allow the reader to draw his own conclusions. At the risk of being indiscreet, then, I shall venture to suggest that the data support the following generalizations:

1. The engineering freshmen of Purdue University in 1929 are superior to those of 1919 with respect to scholastic preparations.

2. The observed superiority is probably in the main to be credited to improved high school instruction.

3. The steady increase in freshman failures indicates an increase in the standards of Purdue University rather than a deterioration of the freshman material.

Diagnostic and Remedial Instruction in Reading Factors Conditioning the Reading Process

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READING as an activity, while appearing as a simple process to the layman and the untrained person, is in reality a very complex process. An analysis of the process reveals at least three distinct variables which condition the success or failure of an effort at reading. The three variables referred to are: the child, the subject-matter, and the method of teaching. Since difficulty in the reading process may result from inadequate consideration of any of the enumerated variables or any combination of them, it seems well to observe the general influence of each of these variables on the reading process before discussing the general program of remedial instruction, for in the last analysis a program of remedial instruction is nothing more or less than a program of good instruction.

Factors Centering on the Child

Three different aspects of the child must be given consideration in the effective mastery of the reading process. As previously stated, recognition of these aspects of the child is fundamental in any program of good instruction, but it often seems that no definite study of the contribution of these aspects is made until inability to read forces diagnosis and the formulation of a program of remedial instruction. The three aspects of the child, so fundamental in conditioning the reading process, will be referred to thruout this discussion as the "physical equipment," the "mental equipment," and the "educational equipment."

The Physical Equipment. The physical condition of the child undoubtedly plays an important rôle in the proper mastery of the reading process. It is obvious that properly functioning sense organs are essential in the normal acquisition of the reading activity. A child who has defective vision will have great difficulty in the visualization and recognition of the symbols which he is supposed to see, for even a child with normal vision sometimes has difficulty in recognizing a given group of symbols. The child does not see these symbols as they appear to the adult and much effort must be expended before the outstanding characteristics of presented words will call forth the proper responses. If properly seeing words or groups of words presents a problem to the child with normal vision, it is obvious that the problem is vastly more complicated for the child with defective vision. A child whose hearing

is abnormal will be unable to detect the fine differences in the pronunciation and enunciation of words. Such a child will not hear accurately the words spoken by either the teachers or the other children, and furthermore, he will not be able to determine when he has enunciated correctly. A child with imperfect organs of speech or with improper muscular control will likewise encounter difficulty in pronunciation of words. Even tho the child may see and hear correctly, if he has abnormal organs of speech or uncontrolled muscular activity, he will not be able to enunciate clearly and distinctly and will present a problem to his teacher.

Other aspects of the physical equipment of the child are health and general vitality. It is conceivable that a sick child may learn to read, but such children are as a rule not the concern of the teacher. No doubt, the physical condition of the child exerts an enormous influence on his learning to read. If a child has good health, is properly nourished, is energetic, has good vitality, and is freed from any signs of nervousness, the task of teaching him is greatly simplified. Such a child is willing to put forth effort and is thrilled by successful accomplishment. On the other hand, a child in poor health, nervous, fretful, lethargic, undernourished, troubled with adenoids or diseased tonsils, suffering from the effect of a past disease, presents an entirely different problem.

There are other aspects of the physical equipment of the child which condition the process of mastering the reading activity, but a sufficient number have been enumerated to indicate the necessity of giving consideration to the nature of the physical mechanism of the child. In large and more modern school systems, the school physician or the school nurse determines the physical fitness of the child for the educational task at hand and often provides the teacher with a case history so that she may proceed with her task in a more intelligent fashion. However, if there is no school physician or nurse, it falls to the teacher or the parent to consider the physical equipment and welfare of the child in order to make sure that a state of readiness for instruction exists and that physical handicaps are not a deterrent to learning.

The Mental Equipment. The mastery of the reading process presupposes a certain mental ability, sometimes referred to as intelligence. Intelligence is often defined as the general ability to learn or to reason. Thus a child, if he is to learn to read, must possess a certain amount of this mental ability, and it is reasonable to expect that mastery of the reading process will be in proportion to the amount of this mental capacity possessed. Dickson, after an investigation of a year and a half's duration with children in Grade I, concluded that "mental age and I.Q. are important factors in revealing a child's chances for success in his school work." He indicated that the children who had low achievement on tests had difficulty in learning to read; they had little initiative; they could not retain what they appeared to learn; they tended to be mere word-callers. He stated that in a group of borderline cases(with I.Q.'s of 85 or below) only six could read in an easy primer after nearly a year and a half of instruction by a most competent teacher.[1] The presentation of his report suggests that the child with an I.Q. of 85 or less does not

[1] V. E. Dickson, "What First-Grade Children Can Do in School as Related to What Is Shown by Mental Tests," *Journal of Educational Research* 2:475-80, June, 1920.

have sufficient mentality to master the process of reading. Terman has pointed out that a child with a mental age of less than six years has little chance of successfully accomplishing the work required in Grade I.[2] Theisen, after presenting the evidence concerning the different factors affecting the mastery of primary reading, says, "Of all the factors which make for progress in primary reading, intelligence is probably the most significant. It has not, however, been sufficiently recognized in dealing with small children."[3] Many more recent references might be cited to show the importance of mental capacity in learning to read, but those given indicate clearly the need for considering this factor in the teaching process.

The general attitude of the child, as well as his mental capacity, should be observed. The healthy child is apt to be an active child, but it is possible to conceive of a child who is not interested in learning to read. A child may be in a state of readiness to learn and put forth effort in learning, or his own mind-set may be against learning and he may be unwilling to make any effort to learn. If by chance he has speech defects or improper muscular control, he may have developed backwardness or what may be termed an inferiority complex, resulting from the jests of playmates or even adult associates. In other words, the child's emotional life may be out of tune with the proper attitude for learning. In this case the mental and emotional equipment of the child needs careful study during the process of teaching reading.

The Educational Equipment. The child's responses in the early days of his life are instinctive, but out of the instinctive activities a body of meaningful experiences gradually develops. Herbart would call this body of meaningful experiences the child's apperception mass. By the age of six, or the time at which the normal child is ready to enter Grade I, the range of these meaningful experiences is rather wide. These experiences involve contacts with the home, playmates, toys, games, pets, parties, trips, vacations, plants, animals, rain, snow, and many other things. In connection with these contacts, the child has acquired a vocabulary of approximately two thousand words which can be pronounced, understood, and used. This vocabulary is derived from the child's first-hand experiences and therefore has meaning even tho it is highly probable that a portion of the vocabulary is not included in the list of *Thorndike's Ten Thousand Most Commonly Used Words in the English Language.* In addition to the possession of this two-thousand-word vocabulary, the child at the time of entrance in school has some mastery of oral language. He understands simple commands and has the ability to follow simple extracts of connected discourse. He can speak in connected discourse, often using in connected fashion three or four sentences each containing seven or eight words. He can repeat little stories which have been related to him and can often recite nursery rhymes, poems, or little selections which he has learned. He can often relate in rather vivid fashion the experiences

[2] L. M. Terman, "The Use of Intelligence Tests in the Grading of School Children," *Journal of Educational Research* 1:23, January, 1920.

[3] W. W. Theisen, "Factors Affecting the Results of Primary Reading," *Twentieth Yearbook* of the National Society for the Study of Education, Part II (1921), p. 5.

which he has had. He can name correctly a large number of pictures representing common aspects in his environment, and at times he may be able to recognize the printed symbols of a few words which he may have been taught.

The extent to which the child possesses this fund of meaningful experiences conditions his mastery of the reading process. These experiences constitute the original capital which should be invested in reading activities. The child with a narrow range of vivid experiences will have little capital upon which to draw, but the child with a wealth and variety of meaningful experiences will have such an amount that the reading process will be mastered with ease and enjoyment. These experiences also furnish a basis for the natural expression of what is read and provide the key for proper interpretation. Surely the wide-awake and progressive teacher of reading should take an inventory of the reading capital with which the children in her class are equipped and use this capital in her teaching of reading.

Factors Centering in the Subject-Matter of Reading

The second group of factors which condition the reading process are those involved in the material which the child is supposed to read. This material often presents needless difficulties in learning and is not conducive to the formation of proper reading habits. These difficulties may be roughly classified as those of vocabulary and those of content.

The Reading Vocabularies. One of the great difficulties in learning to read from a book lies in the fact that its vocabulary is different from the spoken vocabulary which the child understands and uses. It has been previously pointed out that the child upon entrance to school possesses a vocabulary of approximately two thousand words which he pronounces, understands, and uses, and yet until recent times the use of these words in the vocabularies of the reading books was largely neglected. It should be obvious that the easy approach to the mastery of reading is thru the words which the child already knows how to pronounce and use. The utilization of such words frees the teacher from the necessity of teaching the meaning of the words and enables her to center the attention upon putting meaning into the symbols which the child already understands. Yet much of the subject-matter in the books which the child is expected to read is expressed in words foreign to his experience.

The vocabulary load in many of the books is rather heavy. The average number of words contained in the beginning books for twelve different series of readers is 406 words. The smallest number of words in any book is 157; the largest number of words in any book, 630. Examination of the vocabulary count of ten second readers shows that the smallest number of words in any book is 1,198; the greatest number of words in any book, 1,910. A study, a few years ago, indicated that the number of words in a given third reader was 3,304. It has also been determined that a child in Grade III, if he is to know the

words encountered in reading and spelling, must master 9,704 words.[4] No doubt the number of words in other grades is much greater than in the first three.

The task of learning the words constituting the vocabularies of the different books is greatly complicated because of the lack of repetition of the words. Of all the words appearing in ten first readers, 59 per cent are repeated no more than four times; 57 per cent of the words appearing in ten second readers are not used more than five times. Thus, hundreds of words in each of the books occur but once, twice, or three times—an amount entirely inadequate to guarantee mastery. The problem becomes even more complicated when it is found that, of the 1,636 words in twelve beginning readers, only 38 words are common to all of the books; of the 3,541 words in ten first readers, only 96 words were common to all; only 419 are common to all ten of the second readers. In the face of this situation, it is no wonder that when a child moves from one school system to another the teacher to whom the child goes thinks that the previous teacher must have been a poor teacher of reading.

But the problem of mastering the vocabulary is still more complicated by the fact that many of the words have more than one meaning. Miss Pennell in a recent study shows that 13 words from a well-known primer have 34 different meanings. To illustrate, the word "for" has six meanings: in behalf of, in exchange of, in order to find, in order to obtain, suitable for, and to the extent of. A list of 222 words in fourteen readers has 842 different meanings. She states that in five widely used primers the average number of words having more than one meaning is 27 words per book and that the average number of different meanings for such a word is 2.79.

In view of the great number of words to be mastered, the small number of repetitions, and the number of different meanings which a large number of the words have, it is little wonder that children have difficulty in mastering them. Within recent years much care is being exercised in selecting the words to constitute reading vocabularies and in providing sufficient review. Recent books in primary reading are beginning to list words used in the book and to record the number of times the words are reviewed, but there is still room for considerable progress.

The Content of the Subject-Matter. The vocabulary is not the only difficulty which the child encounters in learning to read. Many of the stories may be foreign to his experience. It seems that many of the writers of textbooks in reading forget the psychological principle that a child must learn thru his past experience. If a child has not had meaningful experience upon which to base his reading activities, the teacher must develop this experience as a fundamental part of her teaching program; otherwise the child will develop into what may be called a mere word-caller instead of a reader. The same generalization, of course, holds for both oral and silent reading.

[4] *Third Yearbook* of the Department of Superintendence. Chapter on reading gives most of the facts cited in this section.

The content of some of the subject-matter, no matter whether foreign to the child's experience or not, may be uninteresting. Recent studies by Theisen, Pennell, Washburne, Dunn, Uhl, and others indicate that much material which adults think should be interesting to children is not really interesting to them at all. In general, reading materials are interesting to children if they have had meaningful experience with which to interpret the reading content, but it is possible to kill any latent interest thru faulty composition. In some of the old readers, the exercises were nothing but disconnected words and sentences. Such exercises were certainly never developed for the purpose of giving the child a vivid understanding and appreciation of what was being read. Such exercises are mere word-calling exercises. Often, the intrinsic interest in a reading exercise is lost because the sentences composing the material are too long and too complicated, or the relationship between the sentences too intricate.

It is not to be inferred from this discussion of the content of the reading material that the writer has the answer to all of the questions raised. Reference has been made to the questions to make clear the point that the nature of the materials to be read conditions greatly the mastery of the reading process. Authors of reading materials of the present are keenly aware of these questions and are making every effort to prepare material in keeping with a child's experience and interests. They are attempting to use words common to the activities of childhood and to provide for adequate repetition of words. They are attempting to incorporate childhood activities and interests in the subject-matter and to express the stories in a form that the child can easily understand and appreciate. The extent to which these authors succeed will be determined very largely by the reaction of children to the material prepared. If a majority of the normal children react unfavorably, the only valid conclusion is that the material is not well-suited to child nature. Thus it is suggested that a teacher, when confronted with children unable to make satisfactory progress in reading, give consideration to the nature of the material which she is asking them to read.

Factors Centering on the Methods of Teaching Reading

The function of method is to bridge the gap between where the child is and where the teacher wishes him to be, between the child's experiences and the content of the reading materials. Method may be thought of as a process of "tuning in," i.e., the establishment of proper wave lengths between the subject-matter to be read and the child's meaningful experience. It may be added that the successful method is the one which produces results without too much "static." Method determines the teacher's approach to the subject of reading; it determines whether she shall use the child's original capital in her early teaching of reading, or whether she shall disregard the child's experience and stress mastery of reading materials which may be foreign to his experience. Furthermore, method determines very largely the child's mental habits and his methods of study. Thus the method

employed in the early teaching of reading, or even in the later teaching of the subject, leaves a very definite stamp on the reading activities of any child.

Different Methods of Teaching Reading. While there are a great number of so-called methods of teaching reading, they may be roughly classified as synthetical or analytical, i.e., the process of building up or the process of tearing down. The outstanding difference in these two methods of teaching reading is in the method of starting the instruction, because in last analysis both methods utilize synthesis and analysis.

The synthetic method begins with emphasis on the letter, the phonetic element, or the word. The main idea is that the child masters a letter, phonetic element, or word, and learns to read by a process of combining letters into syllables or words, phonetic elements into words, or words into sentences. It is contended that ready recognition of these sound and word units will eliminate the emphasis which must be given to analysis and pronunciation in reading sentences and connected discourse encountered in the later stages of the reading activity. It is the old-fashioned dictum "to look after the details and the big things will look after themselves." With the synthetic method the phonetic or word-drill is often given with sound units or words isolated from context. The emphasis is placed upon analysis, pronunciation, and enunciation in the hope that the process of reading in context will be gradually built up. By such a building-up process it is claimed that the child will gain automatic control over the pronunciation of many words and the ability to attack and master the pronunciation of new words which will be encountered eventually.

The approach of the analytical method is entirely different from that of the synthetic method. The analytical method begins with the sentence or even the story. The theoretical basis of this method is the child's meaningful experience. The story may be based directly upon some experience which the child has had, such as a trip to the woods, to the museum, an experience with pets, or the building of a doll house. If the story is not based upon the child's actual experience, the teacher will build up an experience thru the presentation of pictures or thru the relating of a simple story. When the child is thoroly imbued with the event or the experience and can relate the details in complete sentences in a more or less systematic order, the printed symbols representing the sentences are presented to the child. He is told that the first line of the sentences tells the first thing that happened and he is asked to tell what it says. The child responds to the sentences as a whole and is trained in reading them with expression. By and by, all the sentences in the story are exposed and the child learns to respond to them in turn. This is rather an easy process, for the story either corresponds to the child's experience or to the built-up experience. All that is required to make correct responses is the recognition of some outstanding characteristic of the various sentences. The main emphasis in this method of reading is the recognition of ideas, proper expression, and appreciation of the material read. It is contended that the utiliza-

tion of this method will encourage reading for thought and enjoyment and that the child, thru encountering the same words in different sentences, will gradually learn to recognize individual words and finally phonetic elements. The proponents of the analytical method claim that by beginning with the story or the sentence the child will read with proper expression and will of his own accord learn the analysis of the sentences and words into their proper elements, and that little instruction of the type emphasized by the synthetic method will be needed.

The discussion of these two methods of teaching beginning reading must of necessity be incomplete, but the descriptions given are sufficient to show that they stress two different sets of mental habits and present different types of difficulties in the mastery of the reading process. If this be true, then method of teaching is a most important factor in conditioning the reading habits of a child.

Diagnosis of Reading Difficulties

If the foregoing discussion of the factors conditioning the reading process is sound, then the factors centering in the child, in the subject-matter to be read, and in the method of teaching provide the clews to a proper diagnosis of reading difficulties. Examination must be made of the child's physical equipment, with emphasis on the sense organs of sight, hearing, and speech, on health, and on mental and educational equipment. The child should be studied thoroly from the medical, psychological, sociological, and educational standpoints. It is important to ascertain the present status of health and a record of any past sickness or diseases which may have left after-effects. It is also important to discover the psychological characteristics of a child's behavior at school and in the home. The social influences of a child's environment may also have an important bearing on the development of his original capital of educational experiences. The child's school record showing attendance, promotion, and behavior has significance. But subject-matter needs just as careful examination as the child. In examining subject-matter, consideration should be given to the nature of the vocabulary, the content of the material, its sentence structure, and its appeal to the interest of the child. Careful scrutiny should also be given to the method employed in the teaching of reading. A complete history of the methods used and the child's reactions should be ascertained if possible.

Methods for Diagnosis. While it may be impossible for the teacher or supervisor to provide all of the information mentioned in the previous section, it seems well to suggest a few methods of diagnosis which are available for almost all those engaged in any type of teaching.

1. Determination of the mental capacity of the child. Two or three group tests on mental ability, chosen for the appropriate age and grade, will be helpful. The giving of a single group test is inadequate. The Terman Revision of the Binet-Simon Tests will serve better than a group test if one is trained for giving it. It would be well if a trained individual could administer the group tests, but the manuals of directions for giving and scoring most of the group tests are so well pre-

pared that almost any experienced and well-trained teacher can administer them with a minimum of error.

2. Determination of the child's level of reading ability in as many different phases as possible. Use standardized tests for vocabulary, for rate of reading, and for comprehension of reading in a number of different types of reading situations. In determining the range of vocabulary, use the Jones, Gates, or Thorndike vocabulary tests or some of the vocabulary tests included as a part of the regular tests. In determining the rate of reading, the Cook-Chapman Test, Courtis Silent Reading Tests (Kitten Series), or the Stone Silent Reading Test will suffice. For determining the ability to comprehend what has been read, the Gates Silent Reading Tests, the Detroit Silent Reading Tests, the Sangren-Woody Reading Tests, or the Stanford Achievement Test in Reading are satisfactory. In oral reading the Gray Oral Reading Test is best. In case standardized reading tests are unsatisfactory or not available, informal tests, patterned after the standardized tests, may be constructed. Under most circumstances, it is necessary to construct informal exercises to supplement the standardized tests, for the content of these tests is usually general and a great variety of closely related exercises is needed for complete diagnosis.

3. Tabulation of the errors which the child makes. The errors are usually easily classified and often occur in the same manner. If the informal materials have been properly constructed, they will contain the same words in several different word orders, for experience has taught that a child may respond correctly to the words in one order and incorrectly to the words in another order.

4. Careful observation of the child as he attempts to read or study reading. It is well to study the movement of his eyes, for eye movements are indications of mental activity. However, it is more important to note the method of work. Notice where the child begins to read, whether he moves straight ahead or has to re-read, whether he gets lost on the lines, how he attacks new words, whether he points with his fingers at a word as he reads, whether he utilizes lip movement in silent reading, etc. In connection with observation it is well to ask the child concerning the methods employed and have him show just how he tries to read. The writer is convinced that investigators of reading have failed to make adequate use of the careful study of the reading habits of a child as advocated in this section. Such a method, if adequately carried out, will provide the psychological explanation for the errors which the child is inclined to make.

Two Common Types of Undesirable Reading Behavior. There appear to be many types of reading behavior, but the most common, undesirable patterns confronting the teacher are the "word-callers" and the "memory readers." The observations of the writer suggest that almost all characteristics of poor reading may be classified under these two types of undesirable patterns. Supervisors and teachers are familiar with them. The "word-caller" reads in a slow, halting manner, with attention centered upon each word. He reads in a monotone, without manifesting any feeling, emotion, or understanding. A super-

intendent in one of the large cities of Michigan called my attention to his discovery of a class of "word-callers" in his school system. On a little test, which he gave in one of his primary rooms, he found that the average rate of reading was six words per minute. If you wish to get an exaggerated picture of a primary child's reading, just read the following sentence and pronounce one word every ten seconds: "The big bear said, 'Someone has been sitting in my chair.'" It was reported that the children in this room worked hard at their reading; they studied each word and sounded it out before pronunciation in what was called reading. This illustration is somewhat extreme, but almost everyone has seen samples of this type of undesirable reading behavior. It is not reading at all—nothing more than mere "word calling." This type of undesirable reading behavior is the natural outcome of overstress and a misuse of instruction in phonetics and word study. It is what might be termed instruction in phonetics and word analysis gone to seed. Such instruction surely begets "watchful waiting" in reading. Time pressure drill on the reading of whole sentences, constituting stories based upon the experiences of the children, is the remedial exercise which should be utilized in overcoming this watchful-waiting type of reading.

The "memory reader" is the antithesis of the "word-caller." The "memory reader" makes glib responses to the reading situations presented, but the responses made are very inaccurate. "Memory readers" read fluently, with feeling, expression, and enjoyment, but the reading is inaccurate. Oftentimes the details are supplied from the imagination and do not correspond at all to the material supposed to be read. A beautiful illustration of this type of reading was discovered in giving a reading test to some primary children in a given city, a year or two ago. Since each primary teacher used any method she desired, there were several different methods of teaching primary reading. This test was given in connection with an investigation to determine which method gave most efficient results. The test consisted of two parts: a vocabulary test made up of words common to the first readers being used, and a series of sentences constructed from these words. The tests were administered individually and a very definite record of each child's responses was kept. A small portion of the content of the test is as follows:

This is a cow.
The cow gives milk.
Milk is good for boys and girls.

When one child was confronted with the series of sentences constituting the test, there was something in the situation that set off the response:

This is the way we wash our clothes,
Wash our clothes,
Wash our clothes.

When the child came to the end of this rhyme, she paused, seemed to hunt for some other symbol of familiarity, and then started off on another nursery rhyme, altho the rhyme was entirely different from

the content of the test. The child proceeded in this manner thruout the test and seemed to think that she had had wonderful success in reading the material. One of the amusing coincidents in connection with the giving of the test to this particular child lies in the fact that the supervisor had been in the room just previous to the giving of the test and she had heard this child read the story about "washing our clothes." The child read from the book with good expression and with apparent enjoyment. Her performance on the test suggested that she could have read with the book upside down. Her responses on the test indicated that she had memorized the different nursery rhymes and was able to recite them rather effectively. The reading behavior of this child was not peculiar to her, for other children in the same room tended to respond in a similar manner. Inquiry concerning the method of teaching revealed that the story method, involving whole sentences based upon the child's actual experience or an experience created by the teacher thru story-telling, description of pictures, or dramatization, had been used. Oral presentation of the story to be read had been made before attempting the reading of the story. In this manner the child became thoroly familiar with the content of the story, the sequence of ideas, and the actual language embodying the ideas. Thus, in reading, the child had come to rely almost entirely on her memory. There is nothing strange about this child's responses for she did exactly as other children did in responding to the words of the vocabulary test. When they came to words they did not know, they answered with the words which had recently been in their reading lessons. In the reading of connected discourses the child, instead of responding with words, responded with nursery rhymes. The theory underlying the teacher's method of teaching was to start the child on a story or large thought unit thru which the child might get the habit of reading with expression and enjoyment. According to theory, after a child has mastered a large number of stories and sentences, he will notice that sentences begin or end alike or that the same words are used as a part of different sentences. In this manner, the child will automatically proceed to break the sentence into parts and lead to mere word analysis. According to the point of view of the writer, this is exactly what will happen. According to his point of view, the stage in which the child finds itself is just one stage in the mastery of the reading process by the story or sentence method. The task of teaching this child to read is to cause him to analyze the sentences or story into word or phrase elements. The teacher's task is to help the child to break up the reading material and to modify its memory method of attack. This child's reading may be called the analytical method gone to seed. Such instruction begets the "hit-and-run" type of reading. Phrase and word drills, compelling the child to analyze the component parts of the sentence, or exercises involving the following directions, are necessary for overcoming these difficulties.

The point which the writer wishes to emphasize in the citation of these two common types of undesirable reading behavior is the fact that they are the natural outcomes of the systems of teaching reading. Both

word calling and memory reading may represent natural stages in the evolution of mastery of reading, but will become menaces to effective reading if children remain in those stages for any length of time. The remedial instruction may involve breaking with any given system of reading and substituting a different type of training. What the teachers of reading need is not so much strict adherence to a given system as balance in the system. If teachers and supervisors understand the history and underlying causes of different patterns of reading behavior and see the necessity of balancing types of training, most problems of remedial instruction become relatively simple.

A Case Study Illustrating Diagnostic and Remedial Instruction

The remaining portion of this discussion will be devoted to the treatment given a certain boy in a junior high school who was reported to be failing in his work because of weakness in reading. The description is not as complete as it should be, but it will illustrate something of the process which should be undertaken with pupils having such difficulties.

Diagnosis. Physical Equipment. This boy is fifteen years of age. His health record shows that his height and weight are slightly below normal. His health is good and so far as can be ascertained he has not had any period of sickness in his lifetime that might have in any way interfered with his physical and mental growth. He is a very energetic child but displays no signs of nervousness. His sense organs of sight, hearing, and speech are normal. In fact, everything about the boy's physical equipment, except height and weight, indicates that he is normal.

Mental Equipment. The boy's mental age, as shown by the results of the Terman Revision of the Binet-Simon Test, was 14 years and 10 months—just two months below his chronological age. His intelligence quotient was 99, indicating that he was approximately normal so far as mental capacity was concerned. However, it should be pointed out that an I.Q. of 99 was low among the pupils in the school community in which he found himself. His attitude during the time he was under consideration was good. He showed a fine spirit of coöperation and was something of a leader in extra-curricular activities. His winning personality and fine social attitudes made him somewhat a favorite among his classmates. He had a slight tendency to "wise-crack," which added somewhat to his popularity among his classmates and which at first was thought to be rather cute by his teachers but which they later thought he was trying to substitute for real achievement. His attitude toward his teachers was cordial. When he was under observation and when they were giving him individual attention, he tried very hard to succeed.

Educational Record. He had what may be termed a fairly good educational background. His parents were in what may be called average circumstances and provided a good home environment. They had plenty of books in the home and subscribed to a few magazines, altho

the boy admitted that he had read few books and stories. The parents were much interested in the boy's welfare, but insisted that he should engage in some worth-while activity during his out-of-school hours and thereby earn some money. At the time he was given special consideration concerning his reading difficulty he was conducting a paper route and was proud of his business prowess.

His school record was rather incomplete, but data available showed that he had attended at least two schools before the one he was now attending. No school records of his educational achievement were available, but apparently he had been promoted regularly as his present classification indicated normal progress in school. In fact, at the time of observation his educational age was five months in advance of his chronological age. His record showed that in the previous year's work he had failed in English and had made very low grades in the social studies. His marks in the other subjects were satisfactory but not high. His teachers, when asked concerning the cause of failure in English and the low marks in the social studies, attributed it to his inability to read. His teachers expressed the opinion that his winning personality and his active participation in athletic and extra-curricular activities had won the hearts of his previous teachers and caused them to give him marks of a higher quality than he deserved. His teachers also pointed out that in his present school he found himself among a highly selected group of students and that the quality of work which had previously been regarded as satisfactory was now thought of as unsatisfactory. One teacher suggested that the educational pace in the present school was too fast, and since the boy was beginning to find difficulty in maintaining his position of leadership, he had taken the indirect method of trying to win standing thru "wise-cracking" instead of hard work.

The record from his educational tests showed that his reading ability was about two years less than should be expected. On the Sangren-Woody Reading Test his reading age was 12 years and 9 months, whereas his chronological age was 15 years and his mental age 14 years and 10 months. The grade-level achievements on the Sangren-Woody Test were as follows: Word Meaning, Grade VIA; Rate, Grade VIIB; Fact Material, VIB; Total Meaning, VIIB; Central Thought, VIIIB; Following Directions, VIIB; Organization, VIIB; Total Score, VIIB. Other reading tests showed approximately the same results.

Test results from both standardized and unstandardized tests showed that he had a very meager vocabulary and that he read very slowly. Observation showed that he used a great deal of muscular movement. Observation of his reading suggested that he tried to read everything alike regardless of the purpose for reading. He was especially handicapped when asked to read for total meaning, central thought, or implied meanings. Observation of his reading behavior and analysis of the questions he answered concerning his methods of reading suggested that he tried to recall verbatim everything that he had read. When given a question concerning the meaning of a paragraph which he had read, his typical response was to begin by quoting the first line, or as far as he could, and then remark that he couldn't remember any more. He often

reacted in similar fashion to other lines of the paragraph. The idea of generalizing or reading between the lines did not seem to have occurred to him. He had another bad habit of picking certain phrases or parts of sentences and making replies in terms of these elements instead of the sentences as a whole.

Remedial Suggestions. On the basis of the diagnosis, four different types of remedial exercises were made. The first was for the purpose of increasing his reading experiences and creating an interest in reading. These exercises were rather general with no very definite procedure other than reading a half-hour per day in the library from a list of books dealing with topics in which a boy might be interested. The idea was to get him to read. Easy books were placed on the list and the teacher often motivated the reading by relating a portion of the book to him and asking him to find out something thru reading the remainder of the book. Every motivating device possible was used and every attempt was made to connect the reading with his experience and interests.

The second type of exercise was for the purpose of enlarging his vocabulary. Naturally some attention was given to new words in books being read but special exercises were constructed. Exercises embodying paragraphs, composed of incomplete sentences which were to be completed by selecting suitable words from given lists, were used in order to emphasize the meaning aspect of new words. Exercises were given him in which words, alike in some respect, were to be grouped together. The following exercise illustrates: Classify the following words under the headings: vegetables, fruits, flowers: lemons, carrots, apricots, prunes. Variation of this type of exercise was to give some list of words in which one or two were wrongly classified and to ask the child to find these words and to place them in the proper classes. Another exercise involved selection from a list of words having the same or opposite meaning. He was also urged to keep a dictionary at hand for use in encountering these words and to indicate the marks for dividing and pronunciation of the words and to indicate their meaning. For training him in speed and accuracy of reading, exercises like those in the McCall-Crabbs Standard Test Lessons in Reading were given. The following sample will make clear the nature of these exercises:

TEST LESSON 68

Do you ever wonder where the sugar in your sugar bowl comes from? It may come from one of two plants, the sugar beet or the sugar cane. The sugar cane grows only in warm countries, but the sugar beet grows in states as far north as Michigan.

Sugar cane, when it is growing, looks very much like corn. It is tall and has a jointed stalk. The leaves are long and blade-like. Sugar beets look somewhat like large white turnips. About half of the sugar we use comes from sugar cane and the other half from sugar beets. Some people think cane sugar is better than beet sugar, but there is really very little difference between them.

1. The sugar in your sugar bowl comes from (*a*) animals; (*b*) plants; (*c*) trees; (*d*) bushes.

2. Sugar cane grows in (*a*) Michigan; (*b*) cold climates; (*c*) warm countries; (*d*) almost every country.

3. Sugar beets can grow (*a*) only in the South; (*b*) only where sugar cane grows; (*c*) in Michigan; (*d*) in Maine.

4. When sugar cane is growing, it looks like (*a*) corn; (*b*) turnips; (*c*) beets; (*d*) wheat.

5. Sugar beets look like (*a*) wheat; (*b*) corn; (*c*) potatoes; (*d*) turnips.

6. What kind of leaves has sugar cane? (*a*) long; (*b*) short; (*c*) round; (*d*) curly.

7. How much of our sugar comes from beets? (*a*) ¼; (*b*) ¾; (*c*) ½; (*d*) ⅓.

8. Some people think that the sugar from beets is (*a*) better than cane sugar; (*b*) as good as the sugar from cane; (*c*) more expensive than cane sugar; (*d*) not as good as cane sugar.

9. Between cane and beet sugar, there is really (*a*) little difference; (*b*) much difference; (*c*) no difference; (*d*) a great difference in price.

Exercises stressing the picking out of the central thought, determining whether given ideas were stated in the selection read, or determining the order in which given events occurred in the selection, were taken from some practice exercises developed by Frank Whitehouse, Walter Bergman, and Clifford Woody. The following three exercises are produced to show the general nature of the training given:

EXERCISE I

After reading the following paragraph, read the five statements listed under it; then draw a circle around the number before the statement which expresses best the main idea in the paragraph.

Right this way, ladies and gentlemen, to see the most interesting invention on the fair grounds! See the big, wooden clock, made by a boy in the backwoods of Wisconsin, with only a hammer and a jackknife for his tools. Without doubt, this is the most wonderful clock in the whole world, and what makes it seem all the more wonderful is the fact that the maker of this marvelous piece of machinery had never seen the inside of a clock, or a watch, before he made his first model; had never been inside of a machine shop of any kind to study the working of machinery; and whose first sight of a locomotive was the train that brought him to this fair. And yet this boy has produced a clock that will accurately tell the time of day, the day of the week, and the day of the month; will light the lamp in the morning, and start the fire while he slumbers in peace; and finally, at the appointed hour, will roll him out of bed in time for breakfast without any assistance from his father. These are just a few of the many acts this remarkable clock can do. It will perform almost anything he wishes except to eat; he prefers to do that act himself.

1. The boy who made the clock had seen a train but once.

2. An untrained boy had made this wonderful clock.

3. This clock was made of wood throughout.

4. This clock could tell the day of the week and month.

5. The only tools used in making the clock were a hammer and a jackknife.

EXERCISE 2

Five statements follow the paragraphs given below. Read the paragraphs and then draw a circle around the number before each sentence that contains an idea given in the paragraphs or that is implied from them.

Whang, the miller, with all his eagerness to be rich, was in reality very poor. One night, in answer to his many prayers, he dreamed that under a certain part of the foundation of his mill there was concealed a monstrous pan of gold and diamonds, buried deep in the ground and covered by a large flat stone. He rose up, thanked the stars that they were at last pleased to take pity upon his sufferings, and concealed his good luck in order to have the vision repeated the succeeding nights by which he should be certain of its truth. His wishes in this also were answered. He still dreamed of the same pan of money, in the very same place.

Early in the morning, he went down to the mill and dug under the wall until he reached the large flat stone. The stone was too large for one man to lift, so he ran to the house and told his wife of their good fortune. She threw her arms around his neck and embraced him in a rapture of joy. These raptures did not delay their eagerness to know the exact sum of their wealth. Returning speedily together to the place where Whang had been digging, they found there, not, indeed, the expected treasure but the mill, their only support, undermined and fallen.

1. Altho Whang was already rich, he prayed for more wealth.

2. As soon as Whang awoke after his dream, he started digging.

3. Whang did not tell his wife immediately of their good fortune.

4. His wife was very angry because he had been digging under the mill.

5. Whang and his wife found the mill undermined and fallen.

EXERCISE 3

Read this exercise once and then follow the directions given below.

A very old drayhorse splashed thro a puddle on a Boston street. As the water touched his hoofs, he seemed to be made young again. He put up his head, whinnied once or twice, and set off at a rapid pace, his coal wagon clattering behind. Had the water of the puddle been enchanted? Did he taste once more the clover-scented wind of youth? A younger horse stepped into the puddle. He began to rear and prance as if he were about to be changed into a colt. A very old man who was watching from the pavement decided that the puddle was in truth a magic one—perhaps the same puddle Ponce de Leon was looking for when he saw in dreams the golden city of Cathay. The old man tot-

tered across the Boston street and thrust his hand into the puddle. He sprang back with a sharp cry. Workers from the Edison Electric Illuminating Company were called. They found that a short-circuited conduit had given the puddle a charge of 120 volts.

Below are listed several statements containing thoughts given in or implied from the exercise just read. Read all the statements, and place a "1" before the statement containing the idea appearing first in the exercise; a "2" before the statement containing the idea appearing second in the exercise, and so on until all the statements have been numbered.

.....The old horse paced rapidly down the street.

.....The old horse splashed through a puddle of water.

.....A very old man dipped his hand in the puddle.

.....Men from the Edison Company arrived.

.....A young horse began to prance and rear.

Results. As a result of six weeks of intensive training on materials of the above types, the boy made progress in reading. His educational age, as determined by the Sangren-Woody Reading Test, improved from 12 years and 9 months to 14 years and 6 months. This represents a general gain of approximately two years. He made definite gains on each part of the Sangren-Woody test with the exception of the "fact material." His original score on this phase of reading on the Sangren-Woody test was low and he seemed not to make improvement. He made an outstanding improvement on the "total meaning" test, the test for "following directions," and the test on "organization." He improved on the test for "picking-out central thoughts" but did not make as much improvement on this test, emphasizing the ability to generalize, as on the other parts of the test.

It is possible that part of the gains manifested by this boy can be attributed to his taking test exercises during the period in which he was given training, altho those responsible for training the boy felt that he had made real improvement in his ability to read. Those responsible for training the boy during this present school year indicate that he may have improved somewhat in his ability to read as indicated by improved work in English. However, it seems that he has not improved greatly in the social studies. It is interesting to add that some of his teachers feel his tendency to revert to "wise-cracking" and cute remarks is being worked harder than ever. These teachers feel that this tendency is a direct outgrowth of his craving to attract attention. The boy is still considered a problem in the school, altho all who know him and his work suggest that the intensive training given him in reading has been of advantage to him.

List of Bulletins in the Field of Education, Indiana University

The following is a list of the bulletins in the field of Education, published by Indiana University.

All bulletins which are available at the present time can be secured thru the University Bookstore for fifty cents ($.50) per copy, with the exception of the *Second Revision of the Bibliography of Educational Measurements*, and the *Bibliography on School Buildings, Grounds, and Equipment*, which can be secured thru the Bureau of Coöperative Research, School of Education, for seventy-five ($.75) per copy.

Proceedings of the High School Principals' Conference (November 23 and 24, 1923). Vol. I, No. 1, 1924. 85 p. (Supply exhausted.)

Investigation of Nursing as a Professional Opportunity for Girls. Part I, Technical Study; Part II, Vocational Information Bulletin. By Florence E. Blazier. Vol. I, No. 2, 1924. 69 p.

Proceedings of the Eleventh Conference on Educational Measurements. Vol. I, No. 3, 1925. 141 p.

Proceedings of the High School Principals' Conference (November 14 and 15, 1924). Vol. I, No. 4, 1925. 49 p. (Supply exhausted.)

First Revision of the Bibliography of Educational Measurements. Compiled by the Bureau of Coöperative Research. Vol. I, No. 5, 1925. 147 p. (Supply exhausted.)

Proceedings of the Twelfth Conference on Educational Measurements. Vol. I, No. 6, 1925. 76 p.

The Effect of Population Upon Ability to Support Education. By Harold F. Clark. Vol. II, No. 1, 1925. 28 p.

Proceedings of the High School Principals' Conference (November 20 and 21, 1925). Vol. II, No. 2, 1925. 77 p. (Supply exhausted.)

A Cross-Indexed Bibliography on School Budgets. By Harold F. Clark. Vol. II, No. 3, 1926. 66 p.

A Comparison of the Results Made on Certain Standardized Tests by Pupils in the Bloomington High School Who Were Taught in Classes of the Same Grade by University Student Teachers and by Regular High School Teachers. By Carl G. F. Franzén. Vol. II, No. 4, 1926. 19 p.

Proceedings of the Thirteenth Annual Conference on Educational Measurements. Vol. II, No. 5, 1926. 103 p.

When to Issue School Bonds. By Harold Florian Clark and Paul Royalty. Vol. II, No. 6, 1926. 16 p.

Students' Attitude Toward Examinations. By Grover T. Somers. Vol. III, No. 1, 1926. 48 p.

Proceedings of the High School Principals' Conference (November 12 and 13, 1926). Vol. III, No. 2, 1926. 27 p.

Index Numbers in School Administration. By Harold F. Clark. Vol. III, No. 3, 1927. 35 p.

Topical Analysis of 234 School Surveys. Compiled by the Bureau of Coöperative Research. Vol. III, No. 4, 1927. 111 p.

Proceedings of the Fourth Annual Conference on Elementary Supervision. Vol. III, No. 5, 1927. 64 p.

Proceedings of the Fourteenth Annual Conference on Educational Measurements. Vol. III, No. 6, 1927. 66 p.

Some Phases of the Junior College Movement. By I. Owen Foster, Harold F. Clark, Willard W. Patty, and Leo M. Chamberlain. Vol. IV, No. 1, 1927. 125 p. (Supply exhausted.)

Second Revision of the Bibliography of Educational Measurements. By Henry Lester Smith and Wendell William Wright. Vol. IV, No. 2, 1927. 251 p.

Bibliography on School Buildings, Grounds, and Equipment. By Henry Lester Smith and Leo Martin Chamberlain. Vol. IV, No. 3, 1928. 326 p.

Proceedings of the High School Principals' Conference (November 18 and 19, 1927). Vol. IV, No. 4, 1927. 54 p.

The Economic Effects of Education. By Harold F. Clark. Vol. IV, No. 5, 1928. 39 p.

Proceedings of the Fifteenth Annual Conference on Educational Measurements. Vol. IV, No. 6, 1928. 73 p.

Proceedings of the Fifth Annual Conference on Elementary Supervision. Vol. V, No. 1, 1928. 54 p.

Proceedings of the High School Principals' Conference (November 16 and 17, 1928). Vol. V, No. 2, 1928. 33 p.

The Development and Use of a Composite Achievement Test. By Wendell William Wright. Vol. V, No. 3, 1929. 90 p.

An Analysis of the Attitudes of American Educators and Others Toward a Program of Education for World Friendship and Understanding. By Henry Lester Smith and Leo Martin Chamberlain. Vol. V, No. 4, 1929. 109 p.

Tentative Program for Teaching World Friendship and Understanding in Teacher Training Institutions and in Public Schools for Children Who Range From Six to Fourteen Years of Age. By Henry Lester Smith and Sherman Gideon Crayton. Vol. V, No. 5, 1929. 54 p.

Proceedings of the Sixteenth Annual Conference on Educational Measurements. Vol. V, No. 6, 1929. 96 p.

Proceedings of the Sixth Annual Conference on Elementary Supervision. Vol. VI, No. 1, 1929. 73 p.

An Analysis of the Duties of County School Superintendents and Superintendents of Schools in Certain Cities in Indiana. By Henry Lester Smith and Leo Martin Chamberlain. Vol. VI, No. 2, 1929. 94 p.

Proceedings of the High School Principals' Conference (November 22 and 23, 1929). Vol. VI, No. 3, 1930. 94 p.